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BETTER FRUIT

VOLUME XIV

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NUMBER 11

SMALL FRUIT NUMBER

Brodie D. A.
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Comp.



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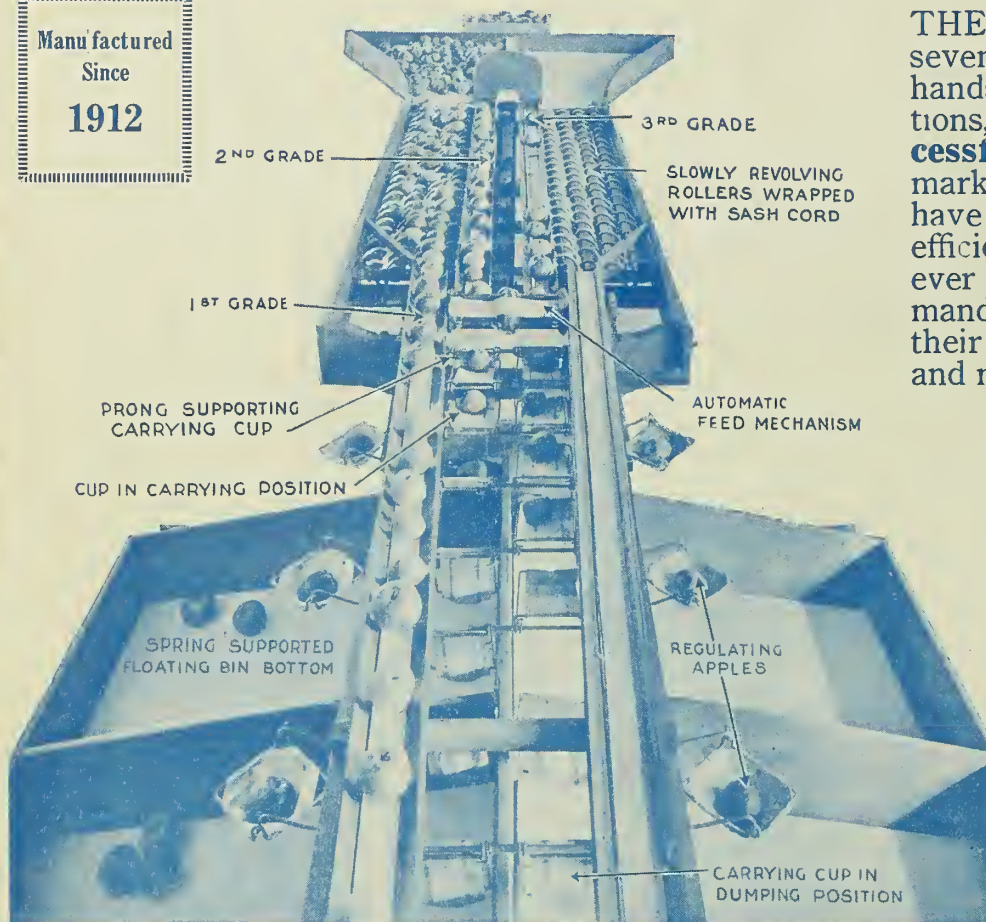
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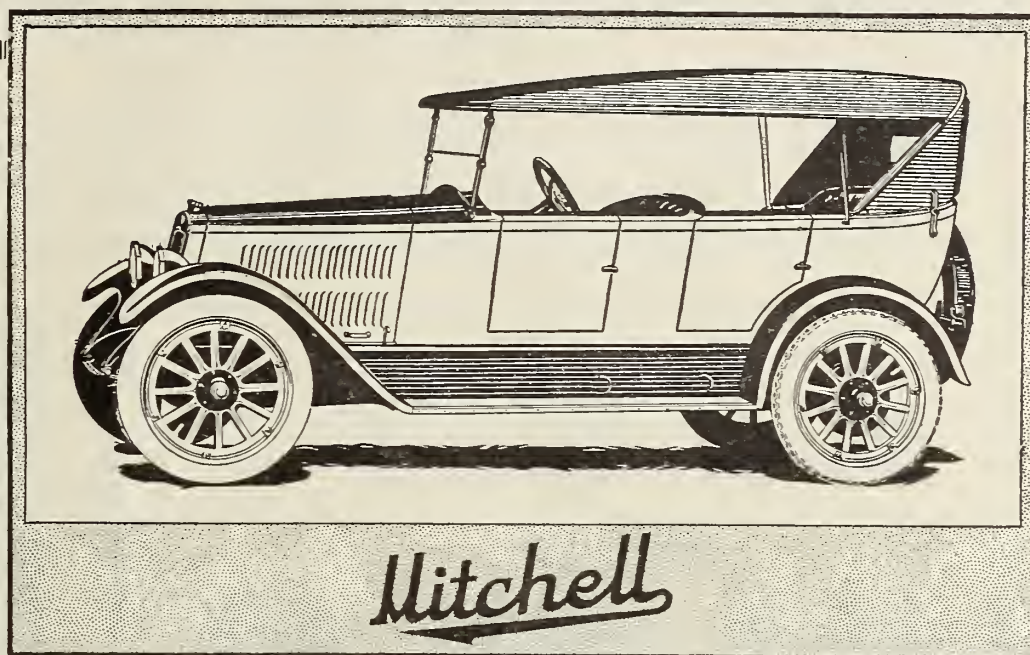
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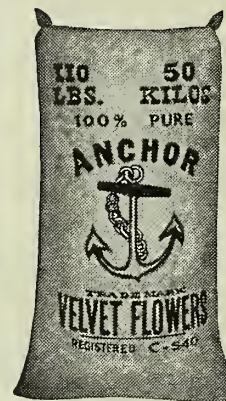
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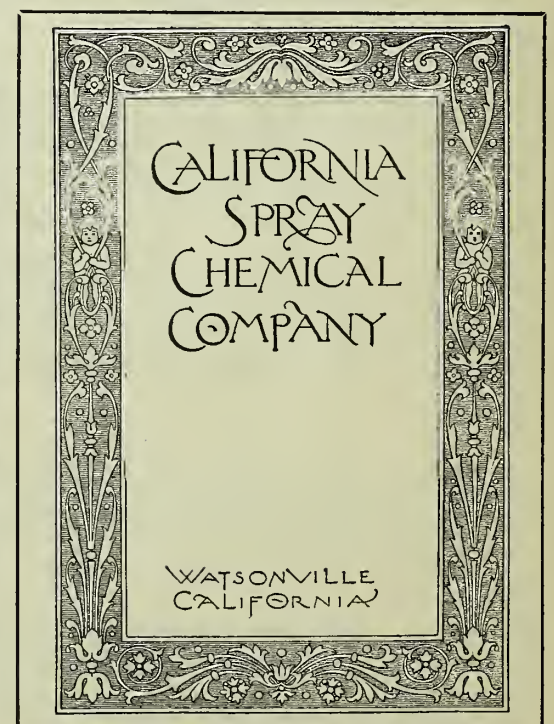
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Raspberry Culture—Red, Black, Purple—In All Phases

By George M. Darrow, Scientific Assistant, Office of Pomological and Horticultural Investigations, U. S. Department of Agriculture

THREE types of raspberries (red, black and purple) are grown extensively in the United States. Red raspberries bear red fruit, have erect canes, and usually are propagated by the suckers which come from the roots of the parent plant. Some of the varieties under cultivation come from the European and the rest from the American wild red raspberry. Among the leading red varieties are the Cuthbert, Ranere and King.

Black raspberries, or blackcaps, bear black fruit, have arched canes which root at the tips in autumn, and are propagated by the plants formed at the tips. All black varieties come from the American black raspberry, which grows wild in the eastern part of the United States. Under cultivation they are not, however, as hardy as some of the red varieties which come from the American wild red raspberries. The Gregg, Ohio, and Cumberland are important commercial sorts of the black type.

The varieties under cultivation bearing purple-colored fruit are hybrids between the red and black raspberries and have canes that arch and root at the tips, as do the black raspberries. The Columbian and Cardinal are leading purple sorts.

Occasionally plants appear of both red and black types which bear yellow fruit, but the yellow varieties in cultivation belong to the red-fruited type. The Golden Queen is the leading yellow-fruited variety. It is rarely grown for the general market, but is adapted to home gardens and to special markets.

The cultivation of the raspberry is limited very largely to the northern part of the United States, chiefly to those sections in which the wild raspberries grow most abundantly.

The red raspberry sections, from which extensive shipments are made, are located in southern New Jersey, in the Hudson River Valley, in western New York, in western Michigan, in the Puyallup Valley of Washington, and about Sebastopol, California. The acreage in southern New Jersey and in the Puyallup Valley of Washington and some sections of Oregon has been in-

creasing rapidly in recent years and is now much larger than formerly.

Black raspberries are grown for commercial shipment in western New York, in western Michigan, in the sections about Wathena, Kansas, and Hagerstown, Maryland, and to a less extent in other places. There are few plantations in the southern states or on the Pacific Coast.

The purple varieties are grown extensively in western New York only, although for local market and home use their range is about the same as that of the blackcap.

Location of a Plantation.

Particular attention should be given to the locality in which the raspberry plantation is to be established.

The hot summers of the south are not favorable to the production of this fruit, which is a native of states having a cool climate. There are few plantations south of Virginia, Tennessee, and Missouri, and even the warmer parts of Virginia and Tennessee are not well

adapted to raspberry growing. The black and purple varieties have not proved to be well adapted to conditions in the Pacific Coast states, although red raspberries are grown very successfully in that part of the country. In most of the Great Plains area and in parts of the mountain states of the west the winters are too severe or the summers too hot and dry for raspberry growing.

The raspberry plantation should be located near a good market or good shipping point if it is to be most profitable. The roads to that market or shipping point should be such that the berries will not be injured when hauled over them. If the fruit is to be shipped long distances it is essential that quick transportation and refrigerator car service is available.

Site of a Plantation.

Three important factors which should be considered in the selection of a site are the soil type, the moisture supply, and the air drainage.

Although the raspberry will succeed



A field of Cuthbert red raspberries planted in accordance with the hedge system. The canes are pruned back in the spring, so that they will support the crop of fruit.
Photo taken at Webster, New York.



A field of Cuthbert raspberries being grown under the linear system of culture. Two wires on either side hold the canes erect. The wires about four feet above the ground and the canes topped about six feet from the ground.
Photo taken at Puyallup, Washington.

on a wide range of soil types provided suitable moisture conditions prevail, the best results will be secured only by studying the peculiar requirements of the different varieties. A fine, deep, sandy loam is perhaps the most desirable soil for growing raspberries, because it is managed so easily. Equally good yields of some varieties will be secured on clay and on sandy soils if they are well managed. In general, however, though the black raspberries seem to do best on sandy soils, they are grown extensively and succeed well on clay soils. Among the red raspberries the Ranere does best on sandy types, but the June prefers a clay soil. Other varieties, such as the Cuthbert and the King, succeed on a wide range of soil types.

The most important, perhaps, of all the factors entering into the growing of raspberries is the moisture supply, and where there is the possibility of a choice, the soil which will furnish an ample supply of moisture at all times should be chosen. At no time, however, should there be wet places in the plantation. Thorough drainage as well as a full supply of moisture is essential.

Another important factor is air drainage. Cold air settles to the lower levels and plantations situated on land elevated above the surrounding fields will not be as subject to the extreme cold of winter as plantations on the lower levels. Winter injury to the canes may often be avoided by choosing a site higher than the surrounding country. Furthermore, plantations on the higher elevations are not as subject to frost injury in late spring as those not so favorably located.

In the southern states, a fourth factor in the selection of a site is of some importance. If raspberries are to be grown in those states, a northern or northeastern slope is preferred for the plantation, as humus and moisture are

retained better in fields on such slopes than on southern slopes.

For home gardens, the chicken yard is frequently a desirable place for the raspberry patch. Poultry keep down weeds and enrich the soil, and do not often injure the berries.

Preparing the Land.

The same thorough preparation of the soil should be given for a raspberry plantation as for corn or similar crops. For the best results the plants should never be set in a field which has just been in sod, but should follow some hoed crop. Land which produced a

crop of potatoes the previous year and which has later been plowed and thoroughly pulverized is in the best physical condition for setting the plants, and any field on which crops have been grown which leave the soil in a similar condition is prepared properly for raspberries.

Planting.

The time of planting raspberries varies in different parts of the United States, according to the local conditions. In general, however, the plants should be set in early spring in the eastern part of the United States, but on the Pacific Coast they should be set during the rainy season, whenever it is possible to do the work.

Because better plants of the black and purple varieties can be secured in the spring, that is the best season for setting them. Red raspberries, however, may be set in the autumn with good success in sections where the winters are mild or where there is a good covering of snow to protect the plants. Some of the advantages of autumn planting in sections where this is possible are the following:

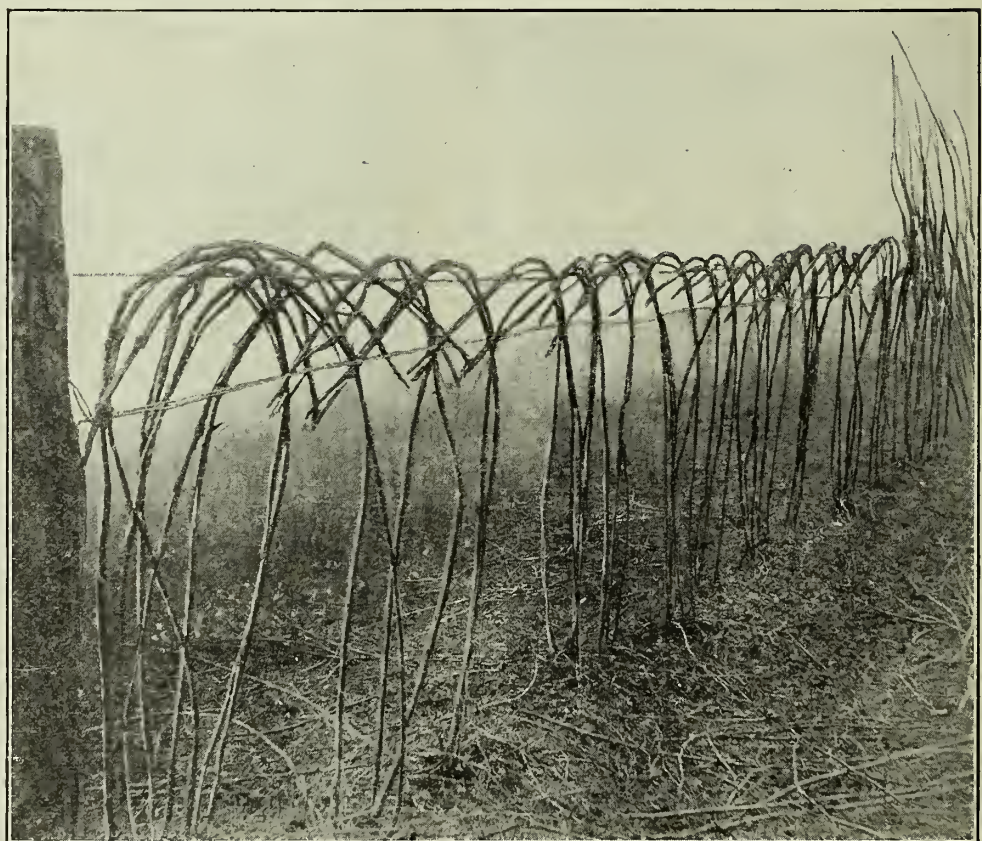
(1) There is usually a much longer season in which the planting conditions are favorable than in the spring.

(2) During the winter the plants become thoroughly established in the soil and they start growth quickly in the spring.

(3) In the autumn the leader buds from which the new canes develop are dormant and are not broken easily. By spring, however, they have grown to a considerable length, often several inches, and then are broken very easily in planting. Unless the root is vigorous such plants may not develop new shoots.

Occasionally when growers wish to

Continued on page 35.



Raspberries planted on the linear system and trained to a wire trellis. The canes are arched over the wire, tied to the lower wire and the projecting ends cut off.
Photo taken at Sumner, Washington.

Planting and Care of Prune Orchard Up to Bearing Age

By George Zimmerman

THE first essentials to be considered in growing a prune orchard are deep, fertile soil, good water drainage and good nursery stock, and then with proper planting and care there is no reason why success should not crown the fruit of your labors. After a suitable location has been found the first thing to be considered is getting the land ready for planting. Plow well and deeply, say ten inches, and if the land has been previously farmed use the sub-soiler in connection with the plowing so as to break up the hard pan, for it cannot be done after the trees are planted except at great damage to the rooting system.

There has been a great deal said in regard to the different systems of setting out orchards, but considering all in all I prefer the square system, for the orchard is easier cultivated—that is, there are less rows to contend with and it is easier to get around with a team and wagon when it comes to gathering the fruit. The method which I prefer in orchard staking is by running control lines two to three hundred feet apart and staking with a wire between these lines. To get the best results control lines should be run with an instrument. If the planting is to be very large establish a base line through the planting and from this control line should be run at right angles. In staking it is very important that the wire should be kept as nearly level as possible to give accurate results. On uneven ground, it is necessary to drop a plumbob from the wire to the ground to locate the place of the stake. Rubber tape is used to indicate on the wire the distance apart the trees are to be set. When I set out my orchard I set the trees twenty-two feet apart or about 96 trees to the acre, but if I were to set out another orchard I would set the trees at least twenty-five feet apart. This may seem a waste of land to the new beginner, but as the orchard grows older, one will readily see the need for putting the trees this far apart. In my orchard, at six years of age, I found roots of trees of the opposite side of the row overlapping.

The selection of nursery stock is a very important factor toward success. Select one-year-old trees with good, clean roots and plenty of them, and a straight top from four to six feet high. If you are not a judge of trees, go to a reliable nurseryman, one who will stand back of his stock. Do not get your trees too early in the fall, for some of the nurserymen start to dig before the wood is mature, and the result is that the trees will soursap and die, a loss in time and money. As soon as you get your stock from the nursery heel in in good shape to prevent injury from drying out or injury from frost, for it must be remembered that the small rootlets are very sensitive to cold or lack of moisture. When you are planting keep a damp sack over the roots of the trees you are packing along, as this will guard against any injury.

Planting may be done at any time after the trees are dug in the fall until the buds show signs of activity in the spring, but at no time when the ground is wet enough to puddle or to pack around the roots. I prefer the early winter planting, as the soil has a chance to settle before spring. Before planting take a sharp knife and cut off the bruised ends of the roots where they have been cut when taken up from the nursery. This will insure the bruised roots to heal over readily and be less liable to disease infection. When you are ready for planting take the planting board (which is made by taking a one-inch by four-inch piece four feet long, cutting a notch in each end and one in the center), place it so that the stake which indicates where the tree is to be set will be in the notch in the center of the board and then place a stake in each notch at the ends. Remove the board and the center stake and you are ready to dig the hole. When planting dig a hole deep enough so that when

the top of the longest root going downward rests on the bottom of the hole, the tree will rest two or three inches deeper than it did in the nursery. Very great care should be taken so that the soil is well worked between the roots and that every root goes out naturally from the tree stock. If this is not done and the soil is thrown into the hole carelessly the roots will all be crowded together, which is very undesirable. After the tree is planted head back to about three feet and four inches, and then with proper pruning in later years the tree will be kept up so that cultivation will be done without great difficulty.

One of the greatest factors that has to do with moulding out the prune orchard is the cultivation given up to the bearing age. I practice clean cultivation and think it is the only cultivation that should be done in any orchard, especially during its formative period. I will give here the method that I use here in the Willamette Valley. In different sections of the state it will vary somewhat. Plow as early in the spring as can be done without injury to the physical condition of the soil. I use the heavy harrow, disc and roller if necessary in the early part of the season, say May 1 or May 10. The soil should be thoroughly worked down by this time so as to prevent too rapid drying out. After this I use the Kimball light harrow or other tool. These lighter tools are used to break capillarity and to form a dust mulch to retain the soil moisture. I use these tools up to about July 1; after this time we have very little rain to settle the soil and start capillary action and to start the weeds. Give your orchard a good start by thorough cultivation the first years of its life and you will have a healthier orchard, for I have found by practical experience that it is always the weaker trees that succumb to disease. There will be less resetting and your orchard will bear at least one year earlier.

Pruning may be done at any time after the leaves have fallen until the trees show signs of activity in the spring. There are a great many different opinions as to the methods of pruning a prune orchard, and they may all lead to a reasonable degree of success, but the following is a model that I have pictured in my mind and toward which I am constantly working. The object of pruning is, first, to mould the young trees as they grow into a uniform shape so as to produce the maximum amount of fruit without injury to the tree; second, for the size of the fruit; third, so that cultivation can be done without great injury to the lower branches and with a reasonable degree of comfort. It is the tendency of the prune tree to gradually droop down a little from year to year after it starts bearing. As previously stated, top the tree at three feet four inches. The first year the trees are planted every bud along the stem has a tendency to



Prune tree with its covering of blossoms.

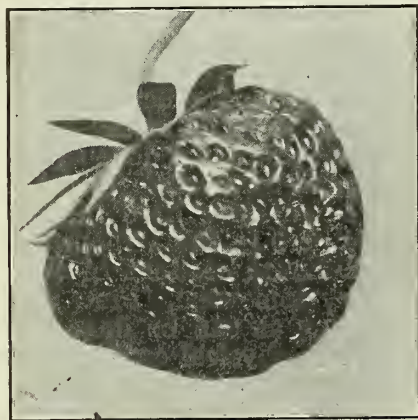
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Points on Strawberry Growing for Beginners

Bureau of Plant Industry, United States Department of Agriculture

STRAWBERRIES are propagated commercially by the use of runner plants only and where nematodes and other diseases are not serious growers can raise their own stock from their bearing plants. In securing plants for planting the roots of the bearing plants should be disturbed as little as possible.

In most localities the season of planting will depend upon the period of the greatest rainfall, although it is not necessary to rely so largely on the rainfall where irrigation is used. As the period of rainfall is the heaviest in the winter and spring in Oregon, Washington and California, growers in these states gen-



Hood River's berry specialty, the Clark Seedling.

erally set their plants during the early winter and late spring. In Western Oregon and Washington and in the more northern parts of the irrigated regions in these states early spring planting is preferred by most growers as a severe winter is apt to injure the fall set plants. In most parts of California late fall and early winter are preferred as the climate is such in that state that plants set at this time make a good growth during the winter and allow of harvesting a considerable crop during the summer. Experience has taught strawberry growers in California that strawberry plants can be set at almost any time on sandy soils during the winter, but on heavy soils the best results are obtained by setting the plants just after the first rains. If heavy rains occur before the planting is finished, however, California growers prefer to wait until early spring to set plants.

The hill system and the matted row system are both used in planting strawberries in the Pacific Northwest, although the former system is more generally employed in the states of Oregon and Washington. When strawberries are to be grown under the hill system the plants are usually set 12 to 30 inches apart in the row and all runners removed as they appear. Under the matted row system the plants are set from 18 inches to four feet apart in rows and part of all the runners which appear are allowed to root. The most common practice in the irrigated sections is to allow each plant to make a definite number of new runner plants. These

plants are spaced from six to eight inches apart and all the others removed as fast as they develop. The spacing is done by covering the tips with earth as soon as they enlarge.

Both the hill and the spaced matted row systems are used extensively in irrigated regions. The particular system to use will depend much on local conditions. Where the soil is heavy and rather impervious to water, narrow beds must be made and the hill system should be adopted. In cases where the soil is penetrated readily to some distance by irrigation water, the beds may be wider and the spaced matted row system may be used. One advantage of the matted row is that the beds are wider and that there are fewer furrows to care for. Both systems, however, are dependent upon intensive cultivation for the best results, and if sufficient labor is available, one or the other should be used.

Where the labor supply is not abundant, however, and where it is not desirable to use the most intensive methods a matted row in which the plants are not spaced may be used. This system, however, is rarely adopted in irrigated regions.

In the Oregon and Washington sections where strawberries are extensively grown the hill system is almost exclusively used, the plants being set 12 to 18 inches apart in rows 30 to 32 inches in distance. In the Los Angeles region of California where the hill system is used, the plants are set at intervals of one foot in rows two feet apart. In light soil in this section the plants may be set four feet apart in rows three feet apart. In the Santa Rosa dis-

trict of California where the hill system is used the plants are usually set 18 inches apart in rows two feet apart; they are also set in rows with the plants one foot apart in rows three and one-half feet apart and in good soils with the plants eight inches apart in double rows 14 inches apart with an alley 28 inches wide between the beds. In the Sacramento section the spaced matted row system is much used, the beds being made eight feet apart from center to center. The plants are set about 18 inches apart along both edges of the furrows and a spaced matted row is formed from the runner plants.

The following table shows the number of plants needed to set an acre of ground when the plants are spaced in accordance with one of the planting systems commonly used.

TABLE I. — NUMBER OF STRAWBERRY PLANTS REQUIRED TO SET AN ACRE OF GROUND WHEN SPACED DIFFERENT DISTANCES APART.

Distance Apart	Plants to the acre
2 feet by 1 foot.....	21,780
2 feet by 1½ feet.....	14,520
3 feet by 1 foot.....	14,520
3½ feet by 1 foot.....	12,446
2½ feet by 1½ feet.....	11,616
3 feet by 2 feet.....	7,260
3 feet by 3 feet.....	4,840
3 feet by 4 feet.....	3,630

Where there is little danger of loss of plants from any cause, only the number indicated will be needed. If such danger exists, a somewhat larger number should be secured in order to insure a full stand, as the expense of irrigating and caring for a field which has many blank spaces will be out of proportion to the value of the crop obtained.

Care of plants—When the plants are received from a nursery, they are usually tied in bundles. Good plants usually have bright, light-colored root systems. When grown on very dark



Harvesting the strawberry crop in Linn County, Oregon.

soil, however, they may be brown or yellowish in color. If the plants are at all dry upon arrival, the roots should be soaked in water for a few hours before planting or heeling in. If they can not be set at once, the bundles should be opened and the plants separated and heeled in. The soil packed about the roots of the plants should be thoroughly moistened.

The plants to be set should be protected from the sun and from drying winds while they are being distributed in the field, either by means of burlap, old sacks, or in some other effective way. An old fertilizer sack may be used for protecting the plants while dropping them.

Setting the Plants—When furrows and beds are made in preparing the soil they will show approximately the rows on which the plants are to be set. Care should be taken, however, to have the rows straight, and the exact place for the setting of each individual plant may be indicated by the use of a marker.

If the soil is very mellow, a place for the roots may be made with the hand, but in heavier soil a dibble or trowel or the tools known as punch and tongs may be used. One accustomed to their use can set 10,000 plants in eight hours and experts can set a much larger number.

Perhaps the most important points in setting plants are to place them at the right depth and thoroughly to firm the soil about the roots after they are set. If the plants are set too high or the soil is not sufficiently firm, they will dry out and die, while if they are set too low and the crown is covered with soil, the plants may rot.

Care After Planting—Where the plants are set in early spring, flower stems frequently appear in a short time. Unless the plants are thoroughly established in the soil these should be removed, as the production of fruit is too great a strain on plants not fully established. When a large number of runner plants are needed, the flower stems should also be removed, as experiments have shown that this practice will increase the number of runner plants that are made.

When all the runners that develop are allowed to root without any restrictions, too many plants form in the matted rows, and some means should be taken to thin them. Sometimes roller cutters are attached to cultivators and all runners extending into the furrows are removed by them. A distance of at least six inches should be maintained between plants in matted rows, and when necessary, the plants should be thinned with a hoe or by hand in order to prevent overcrowding.

When the plants in the matted row are spaced, the strongest runners are selected. As soon as the tip of a runner has enlarged and a leaf appears, it is covered with soil. Each runner is thus made to take root at a predetermined distance from the parent plant and from adjoining runner plants. Sometimes a large number of runner plants are made to root, either in distinct rows or at a distance of about seven or



Berries being grown between the trees in a Washington district.

eight inches from each other, and all runners except those used are removed by a hoe, knife, or in some other way.

Tillage is practiced to conserve moisture, to aerate the soil, and to keep down weeds. It should begin soon after the plants are set, and should be continued during the growing season. As soon as possible after each irrigation, the irrigation furrows should be cultivated. This leaves a dust mulch on the surface which conserves moisture and helps keep the soil in good condition. If the furrows are not cultivated, the soil may become water-logged and may shrink on drying so that large cracks appear. These cracks not only increase the loss of water by evaporation, but may even break the roots of the plants. One-horse cultivators are usually run through the furrows, and hand hoes or rakes used on the beds. In light soils, a horse cultivator may be used as often as once every four to six days, while in the heavier soils, once every week or two weeks usually will be sufficient.

Maintaining the Fertility of the Soil—The use of stable manure and fertilizers on strawberry fields is governed largely by the same principles that apply to other crops. As soils vary greatly in their composition, the use of fertilizers is chiefly a local matter, to be determined by each man for his own conditions. This can be done by applying the different plant foods, nitrogen, phosphoric acid, and potash, separately and in different combinations and varying quantities to small plats, and keeping records of the yields. In like manner, the effect of different applications of stable manure should be tested on small plats. If certain facts are kept in mind, such plats will be helpful in determining the quantities to use. A good crop of berries will remove considerable quantities of nitrogen, phosphoric acid and potash. Excepting coarse sand, most soils are so well sup-

plied with these plant foods that large crops can be produced without fertilizers, provided the physical condition of the soil is good. If, therefore, the soil is kept in a satisfactory condition by the addition of humus and by adequate irrigation and tillage, many soils will need no commercial fertilizer or stable manure. In many localities, however, growers have found the use of fertilizers profitable, but the applications which can be made with the greatest gains vary with different soils and different soil conditions. Much can be done to insure productive plantations by seeing to it that the soil is in the best possible state of fertility before the strawberry plants are set out.

Irrigating Strawberries—Strawberries must have an ample supply of moisture, not only during the season when they are bearing fruit, but also throughout the growing season. As the root system is shallow, the surface soil must be kept moist and the irrigations must be more frequent than for many plants whose roots penetrate the soil deeply, the number of irrigations, however, will depend largely on the character and frequency of the tillage used in conserving moisture and on the type and condition of the soil. If the furrows are thoroughly cultivated as soon as the moisture conditions permit after each irrigation, the number of applications of water can be materially reduced as compared with the number required when cultivation is neglected. In the lighter soils during the bearing season, the fields may be irrigated as often as every four to six days, and in heavy soils every week or two. During the months when the plants are not fruiting, irrigation need not be so frequent as when the crop is developing, only enough water to keep them in a thrifty growing condition being necessary.

During the fruiting period the usual

practice is to irrigate immediately after each picking. Sometimes, when there is danger that the water in the furrows may not be absorbed before the following picking, the field may be covered by two applications, alternate furrows being irrigated in turn. The pickers can then use the unirrigated furrows when at work.

In California the plants produce fruit for several months, from late in March or early in April until September or October; sometimes even until Decem-

ber. In that state, therefore, water will be needed for bearing plantations through a much longer season than in states where only an early summer crop is produced.

The Strawberry as An Intercrop—The strawberry is grown quite largely as an intercrop in orchards in most irrigated regions. In sections where the water supply is under control of the grower and a sufficient quantity can be used to supply both the trees which are being grown for the permanent crop

and the strawberries, this plan is practicable. If properly managed, the strawberries should pay a large part of the expense for the care of the orchard until it comes into bearing.

In a few locations strawberries are used as an intercrop in cherry and pear orchards, and to a slight extent in orchards of other fruits.

In non-irrigated regions the interplanting of orchards with strawberries is inadvisable except under well-considered restrictions.

Some Useful and Timely Hints on Peach Growing

By H. P. Gould

FOR various reasons it is sometimes desirable to change the top of a peach tree from one variety to another. A grower may find after his orchard begins to bear that he has a larger number of trees of some variety than he wants; a block of trees may prove to be some other variety than the one ordered; or, for some other reason, a variety is not well adapted to the needs of the owner. In such cases he has recourse to top-working the tree either by budding or grafting to a desirable variety.

The ordinary method of shield budding is the one more commonly used for this purpose. If the tree to be top-worked is not more than two or three years old it is usually practicable to insert the buds directly into the main limbs well down toward the point where they leave the trunk.

If the tree to be top-budded has reached the age when the bark on the main limbs has become too thick and firm to be manipulated readily for budding, it is necessary to head it back somewhat, as when the top is to be replaced with new growth of the same variety, and then insert the buds on the new branches that develop after the tree has been deheaded. When this course is followed the buds should be inserted in the new growth as near the trunk as is practicable, in order to have as large a portion of the top as possible of the new variety. This is also desirable on account of the subsequent management of the tree.

Top-working is sometimes done by grafting instead of budding. The ordinary cleft graft is generally used in such cases. However, budding is to be preferred, especially as the wounds made in grafting do not heal as readily in the case of the peach, though when properly done the union of stock and scion is generally strong enough to make a fairly serviceable tree. But trouble incident to the difficulties in the healing of the wounds is likely to occur.

Thinning the Fruit.

In the minds of some peach growers, to teach the thinning of fruit is to teach heresy. The thing most desired by them is the biggest peach crop possible. Then the heavier the "set" of fruit the better, and the last consideration is to pick off any of it until it is picked for market. This is their philosophy.

The matter of thinning the fruit on heavily loaded peach trees should require no special argument to establish the wisdom of the practice but the reasons for thinning may be briefly set forth in the present connection.

The fact is widely recognized that most varieties of peaches, as well as other fruits, for that matter, under favorable conditions, often set much more fruit than the tree can possibly develop to a good degree of perfection for commercial purposes. The inherent natural purpose of the tree is to perpetuate its kind. To this end, left to itself, its tendency is to develop the largest possible number of seeds, with each seed possessing the potential possibility of a new tree.

The grower's aim is for the tree to produce the largest possible amount of fruit that can attain the highest commercial standard. The inherent effort of the tree and the object desired by the growers impose, or at least tend to impose, incompatible requirements. The development of a great number of seeds is a tree-exhausting process. This is opposed to the development of large fruits. To meet his ends in this respect the grower has recourse to thinning the fruit.

There is perhaps no operation in the production of peaches, which requires keener judgment in order to reap its full benefits than does thinning the fruit. However, no fixed rules for it can be given. It is commonly advised to thin so that the fruits will not be nearer together than four to six inches. This direction is quite generally applicable yet it may have several important modifications under different conditions. The strength of the tree, the fertility of the soil, and especially the soil moisture are all co-ordinate factors governing this operation. These factors, together with the size of the crop, or, in other words, the number of fruits allowed to develop on the tree, govern very largely the size and perfection of the individual fruits, except as fungous diseases and insects may affect them.

Obviously, a vigorous tree growing under favorable conditions as to moisture, plant food, etc., can develop a larger number of fruits to good size than can a weak tree, or even the same tree when there is a marked deficiency either in the supply of moisture or of plant food.

The skill of the grower is shown in

his ability to adjust the size of the crop on his trees to the varying seasonal conditions. While he is powerless, of course, to add more fruit, it is quite within his power to reduce the number of fruits on the trees if the season becomes very dry as it progresses. Thus the grower should aim to control the size of the individual fruits by thinning and by tillage and pruning.

It is sometimes argued that the expense of thinning makes it prohibitive. But this is fallacious. While it may cost a relatively large amount per tree, it is the experience of the best growers that, as a rule, actually more high grade fruit is produced on a tree which bears only a moderate crop than on one which is heavily overloaded, and the average fruit on the tree with a moderate crop is of better grade than the best fruit on an overloaded tree.

Another factor is commonly overlooked when the cost of thinning is considered. The operation should be done after the "June drop"—which occurs usually from a month to six weeks after the blossoming period when the imperfectly fertilized and other weakly developed embryo fruits drop off, and before the pits begin to harden. After the "June drop" is over there is but very little dropping of peaches. Hence, practically all of the fruit which remains then will be on the trees at harvest time. It will have to be picked then, anyway. It is a fair assumption that it will cost no more and probably considerably less to pick a portion of the crop in June or July and drop the fruit on the ground than it will to pick it later and put it in a basket, where much of it will have to be handled over several times in grading and picking and packing and then finally discarded as culls because the fruits are so small. Moreover, the fruit on an overloaded tree will sometimes ripen less uniformly than on a tree that has a moderate crop.

It has already been stated that the development of the pits is an exhaustive process. Therefore, the limiting of the number of fruits tends to conserve the vitality of the tree. A large portion of the flesh of the peach is water; hence, if the soil is well supplied with moisture the development of the edible part of the fruit makes a relatively light demand on the strength of the tree.

Control of Insect Pests and Fungous Diseases.

Only incidental reference to insect pests and fungous diseases is consistent in the present connection. This reference is made primarily to call attention to the place which the control of insects and diseases hold in the successful management of a peach orchard and to indicate the sources of help and information which are available to peach growers.

After a grower has pruned intelligently, tilled and fertilized his orchard well, and irrigated it if it has been required, the orchard may be short lived and the crops financial failures if he neglects to give proper attention to the control of the insects and diseases which habitually occur in his region. While it is true that there are some rather serious peach parasites which are regional in their occurrence and some of those which are widely disseminated remain unknown thus far in certain districts, it is likewise true that a considerable number of both insect pests and fungous diseases are to be found pretty nearly everywhere in the country in which peaches are grown.

Every fruit grower should be in close touch with the agricultural experiment station in his state, so that he can refer emergency matters there without delay. Not infrequently, the securing of information regarding the control of some insect pest that has become suddenly threatening or concerning the most effective means of checking the spread of a disease hitherto unknown results in saving what would otherwise have been a serious loss.

Inquiries relating to any phase of fruit growing may also be referred at any time to the United States Department of Agriculture, where without cost, through the department's pathological, entomological and other experts as full information relative to the problems as can be given may be secured.

Interplanted Crops.

The growing of some annual crop between the trees during the first two or three seasons following the planting of an orchard, as an aid in meeting the maintenance cost during the unproductive age of the trees, is frequently an economic expediency. This practice, is seldom, if ever, any advantage to the trees in comparison with thorough tillage by itself, but if interplanted crops are wisely selected and properly managed with respect to their relation to the trees, they are not likely to result in any serious harm.

The interplanted crop ought to be one which needs essentially the same tillage that the peach trees should have. Where this is the case, the secondary crop does not seriously interfere with that operation. But the grower should realize that he is in effect, following a system of double cropping and that because of the interplanted crop he may need to give more attention to the maintenance of the fertility of the soil than he would for the peaches alone. After the trees reach bearing age, they should not be made to compete with another crop. Even if there is sufficient plant

food in the soil to produce successfully two crops at the same time, the peach tree will usually need all of the available soil moisture, except, of course, in sections where irrigation is practiced and there is an adequate supply of water for all purposes. Besides, an interplanted crop would be likely to interfere with the spraying of the trees, if that operation should be necessary, with the harvesting of the fruit, and in other ways.

Provided interplanted crops do not interfere with any of the operations required in the proper development of the trees, a considerable range of choice may be exercised by the grower as to what he shall use. The selection may be governed to some extent by the relative market value of different crops that can be grown in different regions. Muskmelons, beans, peas, cabbages and tomatoes, and other truck crops are extensively grown in this way in different sections. Potatoes are sometimes used but they are suitable only when the crop is so managed that the digging of the potatoes will not amount to a late cultivation, which may be attended with undesirable results. Corn, also, is fre-

quently used, but as very often managed is objectionable, because it shades the trees excessively. Whenever corn is interplanted, an open strip of considerable width should be left along the rows, so that the trees will be fully exposed to the sunlight throughout the season. If a very tall, strong growing variety of corn is used, a wider strip should be left unplanted than where a dwarf variety is used.

Peach trees are sometimes used as an interplanted crop, especially where apples comprise the permanent crop. This practice is both highly commended and emphatically condemned by fruit growers of wide experience. It is probably objectionable in that for a number of years both bearing and non-bearing trees occupy the same area, and it is sometimes desirable to treat a fruiting tree very differently from one that is not bearing, for the best results with each. On the other hand, where a site is particularly favorable for both fruits, a compromise treatment can often be effected, which yields fairly satisfactory results with both kinds of trees.

Winter Injury or Die-Back of the Walnut

By L. D. Batchelor and H. S. Reed, of the University of California, College of Agriculture

THIS article contains an account of studies made through several seasons on the so-called "Die-Back" or "Winter Injury" of the Persian walnut (*Juglans regia*.) In certain districts where walnuts are commercially grown the trees have suffered greatly from this trouble, and in some cases parts of orchards have died from this cause.

Unfavorable soil or climatic conditions which would show little or no effect upon many species of orchard trees, may seriously injure, if not actually kill, a walnut tree. The effect of such unfavorable conditions is often first clearly manifested in the early spring. At that time the tops of healthy trees make rapid growth, whereas the tops of injured trees show no growth whatever. Frequently unfavorable conditions not only cause the death of the uppermost twigs but also of some of the older branches.

"Winter Injury" is a term frequently applied to several conditions, the effects of which are particularly evident in the early spring. Usually "Winter Injury" is most clearly manifested by the death of the young twigs and small limbs and hence is frequently known as "Die-back." These terms will be considered as synonymous in the following discussion.

Winter injury may be considered as the final effect of one or more conditions which are adverse to the normal growth of walnut trees and which eventually cause them to die back in the tops. The following are the most common causes of winter injury: (1) Early autumn frosts, (2) winter drought, (3) high water-table, and (4) alkali soil.

1. Early Autumn Frosts—Young trees are more likely to suffer from early frosts than are mature bearing trees

because the latter go into a dormant condition earlier in the season. Walnut foliage which is still green and shows no sign of its normal autumn color, is apparently as subject to frost injury as are tender vegetables. Such injured foliage drops prematurely, and hence the green, immature twigs are fully exposed to the sun's heat during bright days in fall and winter. The moisture loss, following the dropping of the leaves, is much more rapid from the succulent twigs than from the more mature growth.

In many cases the twigs themselves are not actually injured by the frost, but are killed by sunburning following the loss of the leaves. This is substantiated by the fact that such twigs usually begin to show injury from sunburning about the middle of January. By early spring, more or less of the new growth is dead. In occasional instances, however, a portion of the north side of twigs thus injured may remain healthy and produce normal growth in the following spring. The death of the immature twigs is due not so much to the initial low temperature which killed the leaves as to the subsequent sunburning of the exposed bark. Vertical young shoots frequently show discolorations due to sunburn on the south side over their entire length, while horizontal or oblique branches usually show this sunburned area more strikingly on their upper sides. Such a sunburned appearance of the young limbs in the spring is a prevailing characteristic of trees which have been only mildly frosted the previous fall before the dormant period set in. Inasmuch as the root systems are not injured by this condition, such frosted and sunburned trees, as a general rule, produce a rank, succulent twig growth the sum-

mer following the initial injury. Such growth in turn is less likely to mature early and more likely to be injured by autumn frosts than the normal tree. When the cycle of events just described becomes established, it thus tends to perpetuate itself.

If the trees are kept thoroughly covered with whitewash during the winter months, the injury resulting from sunburn may be somewhat reduced. Such a treatment tends to maintain a lower temperature within the twigs. Too much reliance should not be placed upon this treatment, for it has been observed that at best it affords only partial protection. As a general rule it has been observed that frost injury to the foliage of immature twigs, is practically certain to be followed by die-back to some extent, in spite of any remedy known to the writers at the present time.

The coincidence of frosted foliage and subsequent die-back in a five-year-old grove is shown by Chart I. The new wood on these trees was nearly mature when the first frost occurred in November, 1918. The observations on die-back were made in May, 1919. The majority of the trees that had been frosted showed die-back injury; none were frosted without subsequent die-back. Two trees which were not affected by the first frost still showed a slight injury from die-back. In a few cases, however, it was very apparent from the blackened condition of the twigs, especially the tips, that the wood had been actually killed by the frost at the time of the foliage injury. In such instances as the last it is clear that remedial measures will be of no avail.

CHART I.—THE RELATION BETWEEN AUTUMN FROST INJURY AND DIE-BACK IN A FIVE-YEAR-OLD WALNUT GROVE.

10	9	8	7	6	5	4	3	2	1
x	x	x	x	x	o	o	x	a	o
x	x	x	x	x	a	o	x	x	x
x	x	x	x	x	x	x	x	x	o
x	x	x	x	x	x	x	x	o	x
x	x	x	x	o	x	o	o	o	x
x	x	x	x	x	o	a	a	x	x
x	x	x	x	x	x	x	x	x	o

Die-back trees, a; normal trees, o; trees showing both frost injury and die-back, x.

Injury from frost may be prevented if it is possible to mature the young walnut trees early in the autumn so that the leaves will turn yellow and normally fall from the tree before the first early frosts which usually occur from the 1st to the 15th of November, in many of the lowlands in Southern California. Early maturity can be promoted by withholding irrigation water in the late summer and early fall. Trees which are not irrigated after August 15th may be expected to mature earlier than trees watered in late August and September. Whenever the soil moisture is abundant in the autumn, due either to heavy summer irrigation or to

a high water-table, the trees will continue their growth so late as to be injured by autumn frosts. A high water-table and a frosty orchard site make winter injury a practical certainty. It is doubtful if walnuts can ever be successfully grown on such lands.

2. Winter Drought—We have very convincing evidence to show that trees which enter the dormant period in the fall in a perfectly normal and healthy condition may suffer from die-back due primarily to a lack of sufficient soil moisture during the winter months. During the winter, trees give off moisture through the limbs and twigs. If for a prolonged period there is not enough soil moisture available to the roots, the trees are unable to obtain sufficient water to offset the loss by evaporation from the branches. In that case young branches, the thin bark of which permits rapid loss of water from the wood, may die as a result of desiccation. This injury is first evident when such branches fail to produce new growth the following spring.

It is usually not difficult to distinguish between the injuries caused by autumn frosts and by winter drought. Frost injury is usually confined to one or two-year-old wood, but winter drought may kill back limbs eight years old. Winter sunburning is more common on shoots killed by autumn frosts than on those killed by winter drought, though the sunburned areas may not be clearly defined until January.

The principal contributing factors which bring about such a condition are dry winters and the lack of winter irrigation. Under such conditions the soil may have little or no moisture available for the tree roots below the surface foot and even this zone does not contain an optimum amount of moisture until mid-season of the winter rainy period.

The winter of 1917-18 was followed by a great deal of die-back injury to bearing walnut trees. An examination of walnut orchards during this winter showed that most of the soils were very dry. In several cases in orchards which subsequently showed die-back injury, the moisture in the first four feet of soil was below the wilting point until late winter. Thus the roots were unable to acquire sufficient moisture to replenish the loss from the trees and consequently the tips were killed by excessive desiccation.

We have found that winter-injured trees are more susceptible to die-back the year following the initial injury, than are normal trees. The increased susceptibility of injured trees is inevitable because of the succulent nature of much of the young growth produced. In the summer following the first "die-back," the amount of living wood is small in comparison with the root system, and is forced into very active growth. The type of growth produced is therefore similar to that following a severe pruning of the tree.

The relation between soil moisture and winter injury can be seen at a glance in Chart 1. For convenience in observing the winter-injury in this orchard, we have divided the trees into

three classes: first, trees not winter-killed; second, trees slightly winter-killed, and third, trees badly winter-killed. Reference to Chart 2 shows that the winter-injury was greatest in the lower section of the grove, less in the middle section, and least in the upper section. The two tree rows in this orchard below the lower section shows less injury than the section just above them, due apparently to the fact that no waste water is allowed to run off this orchard, but is held by a dike and thus the lower two rows get an extra amount of water. This orchard has been normally irrigated at the rate of only 1.8 acre inches per irrigation per month from May to October.

The actual number of trees injured in each section was as follows:

	No injury	Slight injury	Badly injured
Upper section.....	48	4	0
Middle section.....	12	26	14
Lower section*.....	1	16	34

*One tree is missing in this section.

This distribution and the fact that it cannot be due to chance, is clearly set forth by the diagram. A soil survey of this orchard shows no appreciable difference in the surface soil or subsoil types within seven feet of the surface. This and other examples which have been studied, point clearly to a lack of soil moisture as the important factor in causing winter injury of the walnut trees in this and many other orchards.

CHART 2.—DISTRIBUTION OF WINTER-KILLED TREES, O. W. MORROW GROVE, HEMET, MAY 15, 1919.

UPPER SECTION														
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
o	x	o	o	o	x	o	x	x	o	o	o	o	o	o
MIDDLE SECTION														
o	x	x	x	x	o	x	x	x	o	x	x	o	o	o
o	o	x	x	o	x	x	x	o	o	x	x	x	x	x
o	a	x	x	x	a	x	a	o	o	a	a	a	a	a
x	a	a	a	a	x	x	a	a	x	x	a	a	a	a
LOWER SECTION														
x	x	a	x		a	x	a	a	a	o	a	a	a	a
x	x	a	x	a	a	a	a	a	x	x	x	a	a	a
x	a	x	x	a	a	a	a	a	a	x	a	a	a	a
a	a	x	x	a	a	a	a	a	a	a	a	a	a	a
o	x	x	x	a	a	x	a	a	x	a	a	x	a	a
o	o	a	x	x	a	o	o	x	o	x	a	o	a	o

o, trees not winter-killed; x, trees slightly winter-killed; a, trees badly winter-killed.

In view of results such as those presented in the foregoing pages it seems evident that it is not difficult to prevent this type of die-back, or winter injury, due to winter drought. The application of sufficient irrigation water to reach the tree roots soon after the harvest season will tend to prevent such injuries. The grower should use a soil tube, or a soil auger, in the autumn to determine whether the soil to a depth of five feet contains enough moisture

Continued on page 32.

Methods of Utilizing California Wine Grape

By Arthur L. Dahl

NATIONAL prohibition has been in effect for too short a period to speak with any certainty upon the effect of the closing of the wineries upon the wine-grape market, but in California the growers are very active in arranging to divert their 1920 production into new channels, and that more than one market will exist for the grapes is shown by sales being made at \$40 and \$45 a ton.

The most promising market for wine grapes this year appears to be the concerns that are planning to put on the market various kinds of table syrups made from wine grapes. One such company is going ahead on a big scale and is buying up considerable quantities of grapes for delivery this season, and by a national campaign of advertising it is hoped to create an immediate demand for grape syrup for table use and for the making of beverages, that will utilize considerable grapes, and what cannot be made into syrup at once will be dried and stored for future use.

Grape syrup is not a new thing in the wine industry, for practically every winery made it for use in sweetening some wines or in the manufacture of brandy, but the syrup thus made was valuable chiefly for its sugar content, and most of the flavor of the grapes was lost in the process. At a recent hearing to discuss wine grape matters, however, it was announced that a new and entirely distinct process for making grape syrup had been perfected by Mr. M. K. Serailian by which all of the natural flavors and even aroma of the fresh grapes can be preserved and transmitted to the syrup, so that the new product is delightfully distinct in taste and ought to create for itself an extensive market if properly brought before the people.

In spite of the fact that there are now on the market a score or more of table syrups, some of which are manufactured much cheaper than the new grape syrup can be put on the market for, it is thought that the new product, by reason of its distinctive flavor, will appeal to a large number of people who are tired of the old flavors and who are constantly in search for something new. Since grapes have served as food and drink for mankind since the dawn of history, and their food values are so well known, a permanent market can be built up for the syrup. The fact, too, that grape syrup, when diluted with water, will make an excellent soft drink, naturally widens its possible markets, and an enormous quantity of the syrup could be used by the various soft drink parlors, confectioners and in the homes, where beverages are dispensed.

One of the problems on which the vineyardists are now working is to preserve the fresh juice of the grapes without having it ferment. As the wine grapes will all mature in a comparatively short season, and it will be necessary to press out the juice shortly after

they are picked from the vines, some adequate means must be devised to either work up this juice into syrup immediately, or else preserve the fresh juice in tanks or casks until it can be made into syrup. Under the direction of experts of the Department of Agriculture and the State University of California, experiments have been tried to preserve the fresh juice by using sulfurous acid. Preliminary experiments demonstrated that liquefied sulfurous acid or a water solution of sulfurous acid were the forms most suited for this purpose. Fumes of burning sulphur are hard to control and sulfites leave too much potash or other base in the product. Sulfurous acid can be completely removed. Tests were made on small laboratory samples of juice and on larger lots in 25 to 50 gallon barrels. Sulfurous acid was added in amounts ranging from .03 per cent to 0.2 per cent. All samples with 1000 milligrams or less fermented within a few weeks. The sample with 1250 milligrams kept perfectly for two months, when it was used. Fifty gallons in a barrel treated with 2000 milligrams kept from September until July of the following year. The large lots were stored in a shed where the temperature varied greatly and was often very hot. The juices containing sulfurous acid were all stored in wooden barrels, as the mixture should not come in contact with any metal.

During the present season a great many independent experiments, some on a commercial scale, will be tried out in California, looking to the saving of wine grape juice for the manufacture of syrups, and it is expected that some satisfactory plan will be devised whereby the grapes can be pressed as

they come from the field and the natural juices saved for sufficient periods to permit of their being processed for the making of food products. When this time comes, the vineyards of the state will again be upon a permanently prosperous basis, such as they were on before prohibition went into effect.

Many independent growers are refusing to sell their 1920 crop and expect to dry all their grapes and market them in the dried state. As the climate of most of the vineyard sections of California is such that sun-drying can be practiced, the vineyardist who chooses to dry all of his grapes can do so without elaborate equipment, and as dried grapes will keep for long periods, the crop is thus given a greater speculative element, as the grower can ship his product to distant markets, if an attractive demand exists there. Dried wine grapes have been used in the past for the making of wine, when fresh grapes were not available. France, on several occasions, when pests or blight ruined her own vines, imported large quantities of dried wine grapes from Spain and other districts, and is said to have made excellent wine therefrom. In the United States during 1918 and 1919 large quantities of dried wine grapes were shipped out of California for use in making wines for family use. Whether they can be marketed as dried grapes for wine making purposes, or as raisins, the prospective demand for the dried article is sufficiently strong at this time in California to lead many growers to plan to convert their season's crop into the dried form, and it is said that all owners of dried grapes of the 1919 season can now dispose of them at a price that will return a handsome profit.

Another prospective use to which wine grapes can be put is in the manufacture of vinegar. In all foreign grape



KEEP BEES!

If you own an orchard you must have bees if you would secure the largest crops of the most perfect fruits, as proper pollination is essential for best development and *bees are the only dependable pollenizing agents.*

You can keep bees anywhere that they can forage within a mile—they require but little attention and will often render you a splendid profit. We can start you right and save you unnecessary work and expense.

Our Bee Supply Catalog lists everything necessary for the successful production of honey; *tells how to care for and handle bees.*

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Write us for
Queen Bees

Western Agents A. I. Root Co.



countries the vinegar made from grapes is considered the best and commands the highest prices. In this country, however, grape vinegar has not met with especial favor, principally because most of that placed on the market was made from spoiled wine by unskillful methods. When made from good material by proper methods it is as good here as in France, and as good grape vinegar contains about eight per cent of acetic acid, which is twice the legal standard, its use is more economical than ordinary vinegar, even though it costs double the price of cider or apple vinegar. Since the first steps in making vinegar are identical with those for making wine, a large part of the present equipment of a winery can be utilized for the new industry. Grape vinegar can be made for approximately the cost of wine or a little more, and it is possible to pay from \$15 to \$20 per ton for grapes, (or about what they are sold for wine-making purposes) and still make an excellent grade of vinegar to sell at 25 or

30 cents per gallon, wholesale. Although the market for vinegar is somewhat limited, it is thought that from one to two million gallons of grape vinegar can be disposed of annually in this country.

In an effort to devise all possible means for converting wine grapes into a profitable crop, the government scientists have reported that certain of the by-products of the manufacture of grape juice, syrup and vinegar can be saved and sold. The pomace from a ton of grapes weighs from 250 to 350 pounds, and contains valuable matters, such as sugar and cream of tartar, which can be extracted and used. The seed, which constitute about four per cent of the weight of the grapes contains an oil that is used for a number of purposes in the industrial world, and the press cake from which the oil has been extracted can be used for stock food, or it can be leached for the recovery of tannin.

the interflow of sap, weakening the tree, resulting in a yellowing of the foliage and small size of fruit, and in severe cases even in the death and decay of the roots.

While the elm and the apple are its principle alternate hosts, the woolly aphid can live on quince, pear and mountain ash. The pear is infested by two species of woolly aphids, a distinctive pear form and the apple species. Of the varieties of apples the Northern Spy is the least likely to be attacked, often remaining free while adjacent other varieties are seriously infested. Nursery stock is apt to become infested and thus the insect finds ready access to a new region. Any nursery plants that show traces of the woolly aphid should be destroyed, and the balance of the shipment should be carefully treated or rejected. The individual trees may be loosened and dipped in a well-emulsified 15 per cent kerosene emulsion, and allowed to dry singly before healing in. For large quantities of trees fumigation with the extremely poisonous cyanide gas may be a quicker process, but the trees then must be loosened so that the gas can penetrate to the roots.

Control of the woolly aphid above ground calls for a forceful spraying with some contact insecticide capable of wetting through the waxy wool. Owing to the present high cost of nicotine sprays probably the best agent to use is kerosene emulsion. This can be prepared by dissolving one-half pound or more of common soap in one gallon of boiling water, and away from the fire churn into the suds two gallons of kerosene. When emulsified and creamy add ten gallons of water whereupon the mixture is ready to use. This should be sprayed with pressure to wet into the colonies, drenching the crown of the tree where the aphids are likely to congregate. Two applications may be ne-

Continued on page 30.

Treatment of the Woolly Aphid of the Apple

By A. L. Melander, Entomologist State College of Agriculture, Pullman, Washington

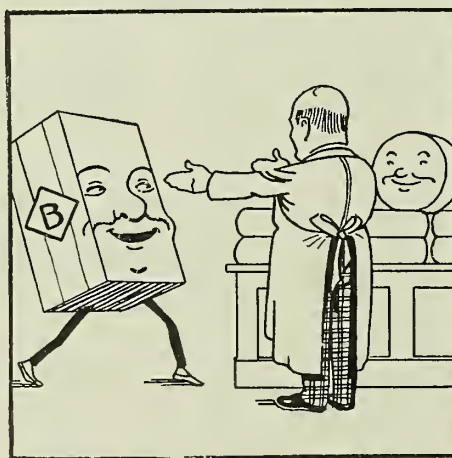
THE Woolly Aphid is one of the most insidious and dangerous of apple pests. Unlike most plant lice this species lives underground on the roots as well as above ground on the branches, and it is the root form which often occurs unsuspected and which does the most harm. While the branch form can be controlled with comparative ease by contact insecticides it is practically impossible to stamp out the root aphids after they get a foothold.

The branch form clusters in colonies along water spouts, on the under side of twigs, about pruning scars, or among the loose bark of the crown of the trunk. Here throughout the summer they beget wingless woolly females that are able to reproduce without mating, each giving birth to from two to twenty young a day during a period of two or more weeks. Following a dozen such generations a brood of winged individuals is produced, usually in September, which fly to elm trees if they are to be found and there produce stunted wingless males and females, the only sexed individuals of the year. These diminutive creatures mate and in a couple of days each female deposits a single egg in the crevice of the elm bark. Rarely the September migrants locate on apple trees, and rarely winter-eggs are to be found in old colonies on the apple, but the woolly aphid is capable of maintaining its existence for years on the apple whenever the agamic females are able to survive the winter. Ordinarily winter weather in Eastern Washington is severe enough to destroy what individuals remain above ground, but in Western Washington and following mild winters in the central part of the state some of the branch aphids are able to live through the dormant condition to assist in repopulating the trees in the spring. Usually it is the mealy root form that tides the species over the winter on the apple.

In the spring of the year, with the

opening of the buds, the eggs on the elm trees hatch, and for several generations the woolly aphid lives on the under side of the leaves, curling and stunting them. Finally in early summer some winged individuals are produced, which fly from the elms to the apple and there complete the year's life cycle. It is interesting to note that while the insect lives on the elm tree it is a leaf-curling aphid, but when on the apple it rarely attacks the leaves, preferring the stems and woody parts of the tree.

The woolly aphid is a serious pest. It is more harmful to young trees than to old. When feeding on the twigs it poisons them, causing more or less prominent swelling. On the roots it forms nodules or galls which prevent



Jack Knox was without a box
In which to pack his cheese.
The best is none too good, quoth he,
As he ordered a strong "B-D."

Many other wise packers of precious products are ordering Bloedel Donovan Boxes, because they know they are strong, well sawed, carefully graded and cut from the best lumber the Pacific Northwest affords.

BLOEDEL DONOVAN LUMBER MILLS

1020 White Building, Seattle, Wash.

*Spruce, Douglas Fir, Western Cedar, Hemlock, Red Cedar Shingles
Box Shooks and Lumber*

1919-1920 Apple Season in the Northwest

A RECENT report issued by E. M. Seifert, Jr., of the United States Bureau of Markets, says that the unusually large crop of apples in the Pacific Northwest in the 1919 season, occurring in a period of high price levels, brought almost undreamed of returns to many orchardists and gave satisfaction to practically all growers. In many instances this year's apple crop paid for the entire farm, and many orchards changed hands at unprecedented prices.

To many of the buyers and dealers, however, the apple season did not prove so profitable. A number of very serious obstacles were encountered on their part. The prevailing high prices and good export demand in the spring of 1919, together with rumors of a prospective short crop, misled many early in the season. Opening high prices had a tendency to curtail consumption. Inadequate and congested storage facilities which tended to impair keeping qualities, together with two severe freezes, caused large quantities of poor fruit to be dumped on the markets. The severe declines in foreign exchange interfered seriously with the anticipated export movement, and the final realization that the apple crop over the United States as a whole was heavy instead of short also caused losses for many apple operators. Acute car shortages caused much trouble and loss. Many early f.o.b. sales were canceled because deliveries could not be made. Hundreds of cars were frozen in transit, resulting in serious monetary losses and the filing of huge damage claims against the railroads.

Quality and Pack.

The quality, generally, was good. The excessive worm injury last year caused heavier spraying this season, and the fruit was practically free from worms. However, much of the fruit was under-size and lacked in color. Some varieties, ripening early on the trees, were further rapidly ripened by unfavorable storage conditions. In February, re-packing from common storage in many instances showed as high as 50 per cent shrinkage. In many instances also, poor grading and packing was caused by labor shortage and the use of incompetent help.

The picking season was exceptionally short and many Winesaps, the last to come from the trees, were caught by the October freeze. Picking started with Jonathans between the 10th and 25th of September; Romes, September 25 to October 20, and Winesaps, October 10 to October 20.

A canvass of the Wenatchee, Yakima, Hood River, Spokane, Walla Walla and Southern Idaho districts was made to ascertain the percentages of the principal varieties grown in each district. From the estimated percentages of each variety grown and the total shipments from each district, the approximate proportion of the main varieties produced in the Northwest this year were determined. These percentages cannot be considered absolutely accurate, but

may be taken as a fairly close estimate. Winesaps 25%, Jonathans 18%, Romes 13%, Delicious 5%, Newtowns 7%, Spitzenburgs 9%, miscellaneous 23%.

Movement and Storage.

The production for the Pacific Northwest far exceeded expectations and the total crop was the largest in the history of that section. The heavy movement from the four Northwestern states and the rest of the country began October 1 and reached the peak on October 17, with a total on that date of 1,362 cars. The Pacific Northwest shipped 536 cars of this total and continued shipping thereafter at the rate of over 400 cars a day until October 28, when the car shortage reduced shipments to less than 300 cars a day. The December cold wave further reduced shipments to less than 100 cars a day, but later shipments increased slightly and continued steadily to a total of over 32,000 cars. Box cars were used in many instances, equipped with heaters and accompanied by messengers.

In 1918 practically all the early varieties were shipped by Thanksgiving and Winesaps were moving freely by that date. This year Romes and even some Jonathans and Delicious were not shipped until January, and many Winesaps were still in common storage long after the middle of March.

The inadequate storage facilities and limited car supply, in the face of increased production in the Northwest, is demanding the serious consideration of growers and shippers. Lack of sufficient storage space caused heavy losses this year. Barns, garages, stores and in

fact every available space was filled to overflowing with packed and unpacked fruit. While some fruit was frozen in these temporary and common storages during the extreme cold weather in December, the heaviest shrinkage and deterioration was probably caused by poor or no ventilation and overheating to keep out the frost.

Prices.

Growers sold earlier than ever before and prices throughout the season were attractive and profitable. Even those who did not sell at the early high prices realized good figures. Throughout the Northwest growers generally sold extra fancy Jonathans at \$2.10 to \$2.25, Romes at \$2.00 to \$2.25, Winesaps at \$2.25 to \$2.50, and other grades and varieties in proportion. The opening prices in terminal markets showed a very wide range, which continued throughout the season.

Many jobbers bought freely for future delivery in the early fall when prospects were bright, but when the car shortage became acute and other adverse factors became evident, many cancellations took place and a general depression set in. However, the consumptive demand increased the latter part of February and, assisted by the prevailing high prices for oranges, the market reacted and buying was resumed. This revival had a salutary effect upon the situation as a whole, but came too late to be of real general benefit.

In most instances the smaller market netted the best returns and took a big percentage of the Northwest crop. The larger markets where fruit could be sold at auction received much of the

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EVERY Owner should use the same goods himself that are used by the Automobile Painters. Never trust to luck. Use Peerless goods, with an established reputation. Sold for 10 years throughout the world.

All the goods needed by Auto Owners to keep their cars like new.

Some of the Goods are as follows:

MOHAIR TOP DRESSING

Waterproofs, dyes and renews leaking and faded Mohair tops.

LEATHER TOP DRESSING

Brightens, oils and softens all tops of Leather, Pantasote, etc.

LINING DYE

Dyes black stained, faded and spotted cloth linings.

CUSHION DRESSING

Brightens and renews dull upholstery. Dries quickly.

FORD TOP DRESSING

Renews and preserves rubber tops. Use Mohair Dressing on cloth tops.

TOUCH-UP BLACK

Air dries quickly with a fine gloss finish. Use everywhere.

FENDER JAPAN

Heavy-bodied, air drying with a rich gloss finish.

CYLINDER ENAMELS

Black and grey enamels that resist heat, grease and gasoline.

BODY POLISH

A good body polish to revive dull finishes.

GASKET SHELLAC

Orange color. Heavy bodied, goes in tack quickly. A perfect sealer.

Eight Color Finishes

Cover solid with one coat, no undercoat necessary. Owners use to paint their cars their favorite colors. Air dry over night.

Manufactured Only by

The Columbus Varnish Co.

Varnish Mfgs.

Columbus, Ohio, U. S. A.

inferior stock. Auction sales of frozen apples as low as 25 cents a box were recorded.

During the past season a greater number of cars were rolled unsold than in previous seasons and to prevent rejections many allowances or concessions were granted. Numerous diversion orders were placed in the effort to locate markets for the rolling cars.

A Dryland Orchard

By H. P. Misel.

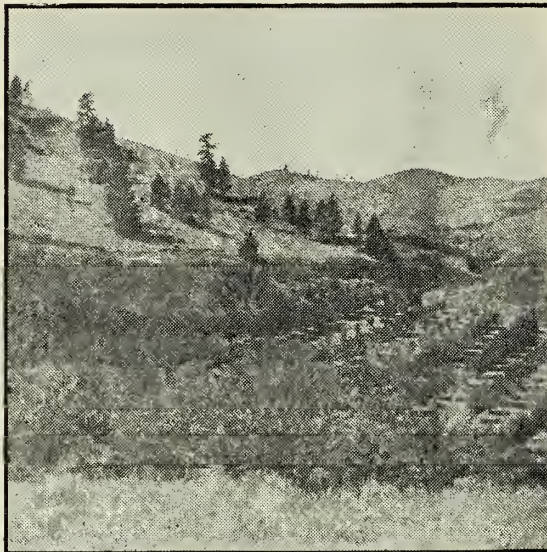
Dryland orchards are a rarity around the irrigated district of Wenatchee. However, twelve years ago my father, G. W. Misel, set out an orchard, where no water was obtainable, in the cove of a hill near Wenatchee. Experience has shown how the setting might be improved for more profitable returns.

The original trees were principally Jonathan, White Winter, Pearmain and Rome Beauty apples and Moorpark apricots. Keen application was given to dry land methods of culture, spraying and pruning. A dust mulch preserved enough moisture to produce large wood growth, although the average rainfall is only around fifteen inches.

The apple trees started bearing at three years of age and produced marketable apples until about nine years old. The spring of 1917 the limbs were all filled with blossoms and the trees were loaded with a heavy crop of fruit. Although well thinned, all the apples except the Delicious failed to gain marketable size. Since then the Delicious

alone have produced apples worth marketing.

All the apple trees, except the Delicious, now adorn the woodpile. A little more time will be given to see if these too will meet that fate.



Dryland orchard maintained by a replanting system.

The apricots started bearing when they were two years old and increased greatly in yield each year. This fruit was unusually large in size and fine in quality. The yield per tree was also large and the demand has always been good. Within the last two years a few of the apricot trees have quit bearing, apparently from old age.

The practical plan now adopted is to replace the apple trees with nearly the

number of apricot trees desired and as the old apricot trees cease bearing to replace them with young trees. These will come into bearing at irregular periods, thereby keeping the production constant. The new orchard would therefor be made up of trees of one kind requiring less work to raise and producing a better and more regular crop.

Phosphorous A Necessary Plant Food

Phosphorous is one of the necessary plant food elements for the growth of all crops and is lacking in an available form in many Oregon soils, according to C. V. Ruzek, professor of soil fertility at the College Experiment Station. In most systems of farming phosphorous is lost from the soil, being absorbed in part by the plant. For this reason it must be supplied by purchasing phosphate fertilizer.

"Phosphorous affects the crops by increasing the percentage of grain as compared to the straw," said Professor Ruzek. "It also causes crops to mature from 16 to 19 days earlier. The rooting system, especially of young plants, is stimulated.

"There are three phosphate fertilizers available for agricultural use in Oregon—super or acid phosphate, bone meal, and rock phosphate. Super phosphate is used most extensively. It is manufactured by mixing a ton of rock phosphate with a ton of sulphuric acid.



And in the berry fields THE American Beauty Dust Sprayer

Gives best protection
at lowest cost
per man and
per acre.
It is crop insurance

Price, \$22.50

The California Sprayer Co.
6001-11 Pasadena Avenue
Los Angeles, California

Bone meal may be treated in the same manner. The product thus formed is called acidulated bone meal.

"Large deposits of rock phosphate are being mined in Idaho and Utah now, and will soon be placed on the market. A considerable amount of this material is to be shipped to Japan through Portland. This should undoubtedly lower the price of super-phosphate in this section of the country, and make rock phosphate available for use as a fertilizer, which has not been true in the past."

Super-phosphate should be applied previous to seeding at the rate of 200 pounds per acre, advises Professor Ruzek. For truck crops larger amounts are applied. Steam bone meal is used at the rate of 300 to 500 pounds per acre. Where applied in combination

with organic matter the amount can be reduced.

To get the best results fertilizers should be thoroughly mixed or incorporated into the soil by a regular fertilizer distributor, or spread broadcast after plowing and disked or harrowed in.

"Phosphate fertilizers should be applied in combination with barnyard manure," continued Professor Ruzek. "Ordinary farm manure is low in phosphorous. A ton contains 10 pounds of nitrogen, five pounds of phosphoric acid, and 12 pounds of potash. It can be readily seen, therefore, that it is a good principle to reinforce manure with some form of phosphorous fertilizer. When super-phosphate is mixed with the calcium sulphate in the manure it prevents the escape of ammonia as a gas, from the manure."

A New Disinfectant for Blight Control Work

By F. C. Reimer, Southern Oregon Experiment Station, Talent, Oregon

IN the work of the Southern Oregon Experiment Station during 1918 it was found that bichloride of mercury 1 to 500 will not destroy pear blight bacteria (*Bacillus amylovorus*) on the wounds of pear trees, but that it will destroy them on the metal tools used in blight eradication work. It was also found that cyanide of mercury 1 to 500 will destroy the bacteria on the wounds of pear trees, but is not always effective in destroying them on metal tools.

It is very evident that the use of two disinfectants in blight control work is objectionable. A disinfectant should be found which will be effective on both the wounds and on the metal tools. In some preliminary experimental work during the summer of 1919 a combination of these two disinfectants was tried using one gram of cyanide of mercury and one gram of bichloride of mercury in 500 cc of water. This disinfectant in this preliminary work proved effective on both the wounds of pear trees to

which blight bacteria had been applied, and also on metal tools used in blight eradication work.

Extensive work with these and other disinfectants will be carried on during the summer of 1920.

The methods used in making these tests, and the results obtained during 1918, are fully described in *BETTER FRUIT* for April, 1919.

Oregon Loganberry Industry

More than a million dollars worth of loganberry juice was manufactured in Oregon in the year 1916, says Professor Henry Hartman of the Department of Horticulture at the Agricultural College. An extensive investigation of the loganberry districts shows that there has been a steady growth of the industry with many new growers going into the commercial field and with an extension of old plantations.

"The demand for loganberry plants

has been so great this year," said Professor Hartman, "that the available supply was bought up in a short time. This indicates that extensive plantings are to be made this spring, since a large crop of young plants were grown by the various nurseries last year."

The loganberry, like most brambles, does best in deep, well-drained, easily worked loam soil. It can be made profitable, however, on both heavy and light soils with sufficient fertilizer and moisture control. It is a gross feeder and will stand large amounts of fertility in the soil, barnyard manure being best. Commercial fertilizers where tried for new plantations have not proved of sufficient worth to warrant their use. Old plantations growing on light, sandy loam may be benefited by their use.

These berries may be propagated by allowing roots to start at ends or "tips" of old canes. In this manner it is possible to raise 1500 to 4000 "tips" per acre.

If these tips are used for planting it is better to plant them in the spring, whereas if older plants are used, plants of two seasons' growth, they may be set either in the spring or fall, at the convenience of the grower.

If lightish-gray spots appear on the leaves and canes or on the drupelets, the affected parts should be removed and burned. If new canes are seriously infected they should be sprayed with bordeaux mixture 4-4-50 which destroys this disease, known as anthracnose.

The average yield for loganberries is 300 to 400 24-pound crates to the acre, although yields up to 600 crates are not uncommon. When sold fresh or for cannery purposes, drying, or for juice manufacture, the price will range from 10 to 14 cents a pound. Gross returns per acre have been found to run from \$500 to \$800.

Peach Crop Estimate Cut 3,000,000 Bushels

The United States Bureau of Crop Estimates in a report issued recently says that the commercial peach crop is now passing through a critical stage in many parts of the country. The condition figure refers to conditions up until April 10. Late telegraphic reports indicate that many parts of the middle west and south have suffered from frosts the past few days so that any quantity estimate this time is tentative.

In general the crop promises to be practically full in California and Georgia, the two leading peach states. The crop in Ohio and Michigan promises to be good, as trees in these states wintered in good condition and are well set with buds. The Arkansas, Texas, Oklahoma, Missouri crop promises to be very light due to the severe freeze which occurred in these states the first week in April.

In the far west the Utah peach crop promises to be very much less than last year and many sections of the state are nearly a failure. The famous Palisade section of Colorado also suffered from winter injury and has about half a crop. The Northwest crop in Washing-

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Mechanically and Scientifically Correct and
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AND THAT IS

The International Dehydrator

BEST CROP INSURANCE IN THE WORLD

Get in touch with us at once if you want delivery for this year's use
Not a makeshift but a Factory Built Complete Plant

WRITE OR WIRE

International Dehydrator Company

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Los Angeles, California

Get our proposition before you decide on a plant

Friend Farmer and Housewife

If your family had contained **4** persons in **1913** and had an income of **\$100** a month; and now, in **1920**, it has **10** persons and an income of only **\$45** a month, then—

Your Case Would Be the Same

AS THAT OF THE Agricultural College University and Normal

Why? Because the fulltime attendance at these three schools has increased **150** per cent since 1913, while state support has increased less than **4** per cent. In addition, the great rise in prices has cut the buying power of a dollar to about 45 cents since 1913.

As a result, classroom, laboratory, equipment, student and faculty conditions are **desperate**. To rescue higher education the legislature has referred to the people the Higher Educational Tax Act for a vote on May 21. This act provides 1.26 mills for the three institutions.

Only One Argument is Made Against This Higher Educational Tax Act

That argument is taxes. Taxes are higher this year than last. But taxes are lower in the United States than in any other great civilized country. Why? **Because of the state-supported educational system of the United States.** This is the safest, freest, healthiest, wealthiest and happiest country on earth. **Education is largely responsible.**

The Surest Way to Increase Taxes Is to Cripple Education

The Agricultural College, State University and Normal add millions each year to the wealth of the state. Consider, for example, the wealth-making contribution of the Agricultural College through its work of improving grain yields, fighting pests, raising the egg output, improving livestock strains and its horticultural and garden experiments.

Where education is lowest, tax rates are highest; where education is best, wealth is greatest and tax rates lowest.

Protect Higher Education on May 21 By Voting 301 X Yes

This advertisement inserted by Colin Dymont in behalf of the Joint Alumni Relief Committee for Higher Education in Oregon.

ton, Idaho and Oregon, was for the most part winter killed. The same is true of New England, the Hudson Valley and many parts of Western New York.

The middle Atlantic states promise fully as good a crop as last year and orchards are in good condition, although acreage has declined materially in West Virginia and Maryland.

The prospects on April 1 were for about 77 per cent of a peach crop in the United States, as compared to prospects for 84 per cent of a crop last year at this time. Allowing for about ten per cent decline as is usually the case during the season, due to unfavorable blooming conditions, the crop would be about 67 per cent full as compared to 75 per cent final last year. The crop is now indicated at 29,240,000 bushels, as compared to the final production figure of 29,461,000 last year and 20,597,000 in 1918. Allowing for the normal decrease which usually occurs during the season, the crop will be about 3,000,000 bushels less than last year.

Replanting Students' Orchard

Editor BETTER FRUIT:—Several years ago Mr. H. E. Burdette, now with the Oregon Nursery Company, at Orenco, Oregon, was foreman of the Horticulture Department of the State College of Washington. In that position he supervised the planting of what was then known as a class orchard. This contained several varieties of stone fruits and grapes, apples, and pears. The orchard was an unqualified success in that it furnished a laboratory for class practice work in pruning, and tree and plant development. Mr. Burdette later graduated from the college and received his degree.

The work of the department has progressed, but in the development of the grounds and buildings the stone fruit orchard was sacrificed for building space. We had been planning to start a new student orchard because of its extreme value to class work. The Oregon Nursery Company heard of our plans and donated over 100 trees of select grade and variety for this purpose. The shipment has been received and is in process of being planted. Such donations are very great help to the institution and under the present financial stress provide material that could not otherwise be secured. Needless to say, it is very highly appreciated.

O. M. MORRIS,

Head, Department of Horticulture.

Rebuilding Spray Machines.

Blacksmith and machine shops in many fruit growing districts are reported to be doing quite a large business in equipping discarded sprayers with new gas engines. Another feature of this business is in supplying higher powered engines for machines that do not have enough power to suit their owners. In many instances these higher powered engines are being put on sprayers that are to use two or more spray guns.

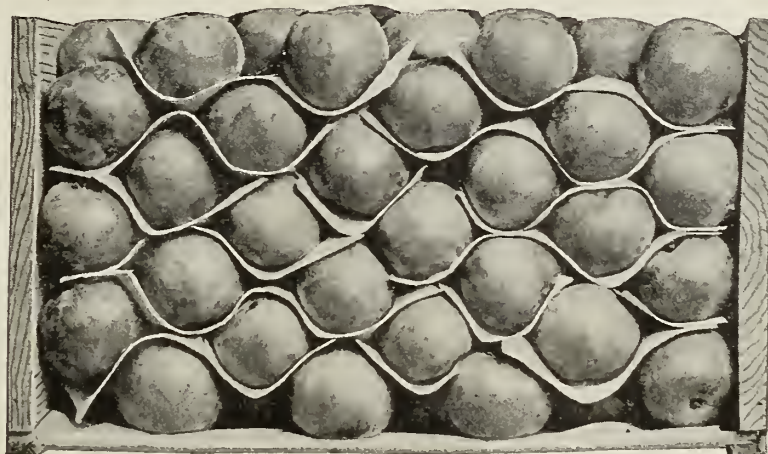
If You Have Fresh Fruit to Pack

**You Will Save Money by Reading this Announcement
which Tells of A Revolutionary Method of Packing Fruit**

**The Sykes System of Packing Fresh Fruit Saves Money and Labor.
It Keeps the Fruit Perfectly. Permits Thorough Inspection and
Allows a Good Display of the Fruit While in the Box.**

SAVES LABOR

Experienced fruit packers with the individual wrap system are not made in a day, and there are not enough experienced packers, no matter how high the wage. With the Sykes wrap, children with but a short period of instruction can become rapid and efficient packers of fruit, and with this system fruit can be packed with both hands.



SAVES TIME

Fruit can be packed more rapidly under this system than under any other method where wrap is used. An experienced packer will greatly increase his output after a few days' packing. Experience has proved that 25 per cent less help than you now employ will turn out as much work.

SAVES MONEY

In addition to the saving in labor cost, the Sykes pack paper costs you less than hand wraps. The saving in paper alone is about one and a half to two cents a box, or about \$10 a car.

KEEPS FRUIT BETTER

Our reports from shipments made in 1919 show that fruit arrives in as good or better condition than when hand wrapped. The Sykes pack, owing to its construction, while it protects the fruit from friction rubs and bruises, still allows perfect ventilation of the fruit. The fruit ripens uniformly, ripens a better color, has better flavor, and does not shrink as much. It has proved that the fruit carries as well, arrives in as good condition and keeps in storage as well as the wrapped fruit.

**Fruit Packed the Sykes Way brings as good prices as when each
piece of fruit is wrapped separately, in the old slow, expensive way**

Fruit Packed the Sykes Way Costs Little More than Packing Without Wraps

You Can Get Delivery If You Order Now

The Sykes System Packs Apples, Pears, Plums, Lemons, Oranges, Tomatoes

Proved Satisfactory by Shippers in 1919

Shipments of fruit in the Sykes Pack in auction cars brought top prices. The side of the box, when opened, makes a display so that the buyer at a glance can see the condition of the fruit.

FOR FURTHER INFORMATION, PRICES, ETC., ADDRESS

American Paper Company
Seattle, Washington

Spokane Paper and Stationery Co.
Spokane, Washington

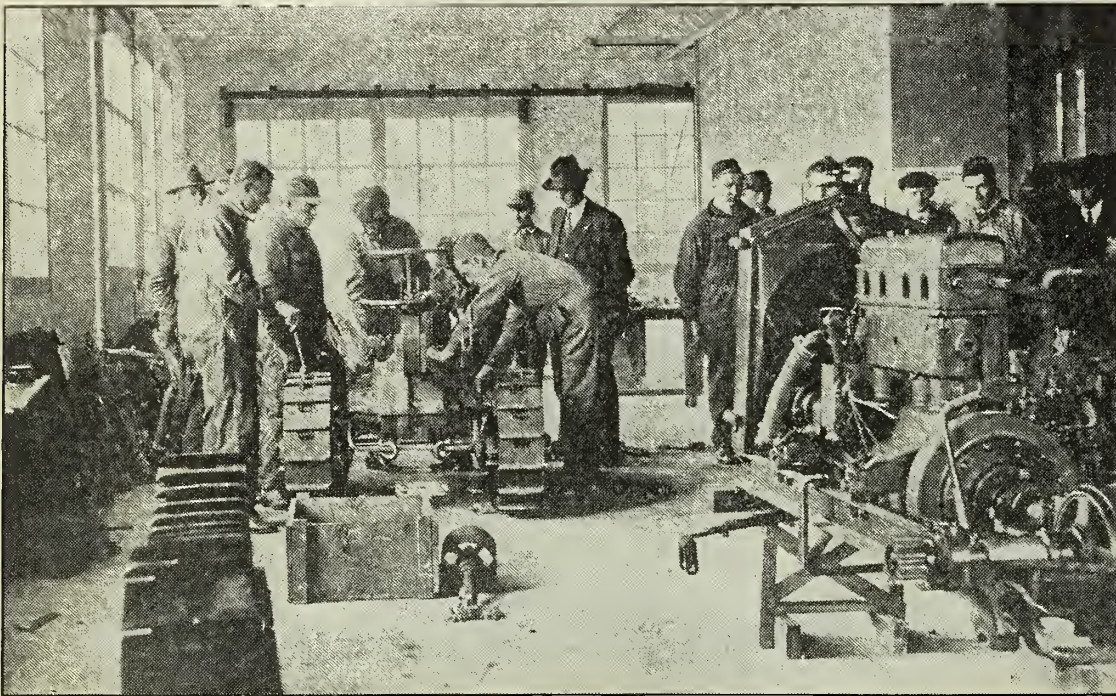
Pacific Folding Box Factory
San Francisco, California

Blake-McFall Company
Portland, Oregon

School for Tractor Dealers is Inaugurated

IN these modern days of efficiency methods of manufacturing and selling, particularly machinery, automobiles, farm tractors, etc., the successful manufacturer has realized that his obligation to a customer does not end with the sale of his merchandise. A man buying a farm tractor, for instance, must be taught how to keep it in good

condition. Otherwise, accidents and breakdowns will work a hardship not only on the man who has already purchased but upon the manufacturer, inasmuch as the purchaser will become a knocker instead of a booster for the particular merchandise.



Dealers' Tractor School at San Francisco.

owner realizes that the best sort of service is the preventive sort. In other words, to understand his machine thoroughly and thus be enabled to avoid breakdowns in the busiest seasons, is far better than to be left in ignorance, with the resulting unnecessary wear and breakage.

This sort of instruction, of course,

It is generally admitted by those who own tractors or who are connected in any way with the tractor industry, that the proper service organization is of the utmost importance. The experienced

should start at the factory and reach the ultimate consumer through each dealer's selling and service organization. The Cleveland Tractor Company, makers of the Cletract tractor, in realization of this fact, are conducting an extensive campaign of this sort. The San Francisco district office of this company has just finished holding a one week's course of instruction, free of charge, for Cletrac dealers and their service organizations. The instruction school was a great success and brought together service men from all parts of California, Nevada and Oregon, who were given the benefit of lectures and instruction by factory-trained men. The course covered in detail all parts of the tractor, and great emphasis was laid on the importance of delivering a tractor right—that is, seeing that the new owner is made thoroughly familiar with the proper care of his machine.

Shall We Bury Wormy Apples

Editor BETTER FRUIT:—During the thinning season of 1919, there was a great deal printed in the Yakima papers against the practice of burying wormy apples. In order to gain first hand information on the subject I tried the following experiment:

I set a joint of four-inch clay tile in the ground so that the bell was flush with the surface. I then tamped earth in the tile to within thirteen inches of the top. I took forty-three wormy apples, though it is not likely that each apple contained a live worm, and on the twenty-ninth day of June, I put them into the tile filling it to within six in-

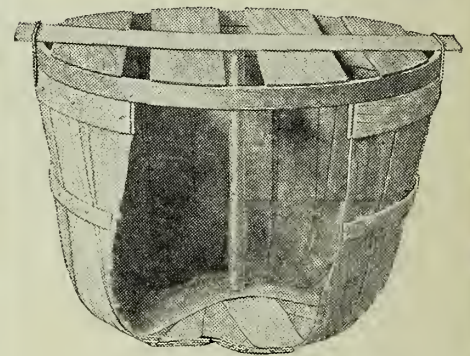
ches of the top. I tamped moist earth on the apples with my fist, filling the remaining six inches of the tile. I put a piece of burlap over the end of the tile and a screen wire over that.

I examined it about once a week during the summer, but never a worm or moth appeared.

On October 12, 1919, I dug the apples out and examined them carefully. I found four larvae in cocoons on the sides of the apples. These would no doubt either have perished in the cocoons, or have hatched into moth, which would have been much less able to dig out than when in the larval stage.

L. M. COX.

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BETTER FRUIT

An Illustrated Magazine Devoted to the Interests of Modern Fruit Growing and Marketing.

Published Monthly
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703 Oregonian Building
PORTLAND, OREGON

Box Apple Distribution.

Notwithstanding a number of handicaps, statistics recently compiled by the United States Bureau of Markets show a wider distribution of Northwestern box apples during the past season than in any previous year. Almost every possible market was invaded, including the South and Southeast, where barreled apples usually reduce the sales of boxed fruit to a negligible quantity.

While this situation is accounted for to some extent by the light crop in the East it did not apply to the Southeastern section of the country, more particularly Virginia and West Virginia, where there was a good crop, but which sections were unable to market as many apples in the big eastern markets during the past season as in 1918, while sales of Northwestern box apples in 1919 greatly exceeded those of any former year. These facts are interesting in that the apple product of Virginia and West Virginia is the strongest competitor of the Western box apple in appearance, quality and pack, and as a rule is sold considerably cheaper.

What is more interesting, however, to the Northwest apple grower, is the announcement of a much wider distribution of Northwest apples in sections that have heretofore been largely untouched, for having once been introduced into these new markets in considerable quantities a demand has been created that should mean still greater shipments in a wider field in future.

More Scientific Pest Control.

In a timely article in the Oregon Grower, entitled "Modernized Control of the Codling Moth," A. L. Lovett, Entomologist at the Oregon Experiment Station, after discussing the necessity of moth control, says:

"The weak link in our chain of control is first hand knowledge of seasonal activities. Try as we will the station at Corvallis cannot properly advise distant fruit districts as to the exact spray schedule for their locality. A variation of 100 feet elevation means approximately four days variation in time of natural events.

"A well trained specialist in each fruit section would cost the district about \$5,000 a year, salary, expenses and all. If your average losses from codling moth have been 12 per cent and he reduces the losses for the district to 8 per cent, figure your crop for this year, add 4 per cent, estimate its value and decide if your section can afford to be without such a man. Where specialists are present they are rendering better service than that.

"It is simply a situation we face; in spite of our knowledge what to use, and

how to use it, the element of timely application is a limiting factor we can no longer ignore or deny.

"Through the aid of the Extension Service a system of mailed notices, similar in character to the weather bureau notices could be developed whereby every grower could be informed just when he should spray. The suggestion is sound, Oregon is ready for such a service. Where such specialists are available the value derived from their timely advice is beyond question. Are we ready to consider such a step, it is absolutely sane."

In summing up his conclusions for a more scientific and perfect control of the codling moth, Mr. Lovett is presenting a matter of dominant interest to the fruit grower. Partial tests along this line have proved to be the saving of many hundreds of dollars to growers. Why not supply the weak link in the chain?

Helping Oregon's Fruit Industry.

While the State Departments of Horticulture of California and Washington are receiving liberal appropriations to carry on the work of developing and improving the fruit industry in those states, Oregon is providing the officials who have this work in charge with an appropriation so small that their work is very much hampered.

Considering the limited amount of funds that the State Board of Horticulture of Oregon has to use in the important work that it is carrying on the board is rendering excellent service.

But the fruit industry in this state is now growing by leaps and bounds, and is fast becoming one of the state's greatest resources in the field of agriculture. To properly care for this already large and growing industry the scope of the Oregon State Board of Horticulture should be enlarged, its authority made more complete and a much larger appropriation made available at the next session of the legislature for it to carry its work on efficiently.

The Standard Apple Box.

The men interested in the fruit industry of the Northwest who successfully combatted the proposal to have Congress change the standard apple box to some other form of container and thereby undo work that it has taken several years to accomplish, are to be congratulated on their success. The standard apple box as the best container for shipping the crop of the Pacific Northwest was evolved after many experiments and conferences and to make any changes in it would be decidedly disadvantageous. With this big fruitgrowing section of the country shipping from one-third to almost one-half of the entire apple crop of the United States, it was entitled to its claims to weighty consideration at the hands of Congress. The Northwest is not objecting to the styles of containers used in other sections, but wants what it believes to be the best for its own uses.

What Newspapers Interested in Fruit Are Saying

Owing to the extreme high price of boxes for the coming season a large number of the Watsonville, California, apple packers have decided to ship a part of the coming season's crop in bulk, loose in the cars. This matter has been taken up generally with the packers and the following firms have agreed to ship at least one-half of the shipments loose: Loma Fruit Company, M. L. Kalich, M. N. Lettunich and T. J. Hogan.—*Fruit Trade Journal*.

Competition between boxed and barreled apples has been more active than usual this year. Northwestern fruit has been offered liberally in markets formerly supplied mainly with eastern barreled apples. Virginia and West Virginia comprise a distinct shipping section usually ranging second to New York but this year the two southeastern states have a combined volume of shipment exceeding that of New York, owing to the short crop in the latter state. The two Virginias are leading eastern centers for such varieties as York Imperial, Ben Davis, Grimes and Winesap. The commercial crop has been sold mostly in New York, Philadelphia, Baltimore and various cities of the southern states.—*The Market Reporter*.

It is impossible to write cheerfully of the present fruit season. Crops generally have been poor and fruit small. Particularly has this been the case with stone fruits, which suffered very badly from the drought. Pear growers are also complaining. In many cases these crops have been rendered almost valueless through the ravages of codling moth. This despite repeated and regular sprayings. True, local prices have been generally good, but this does not help us much when we have little fruit to market. The Cape growers have been the worst sufferers and there is no doubt that the effects of last season's disastrous conditions are still being felt. A really good manuring would be a wise tonic for many orchards but with Karroo manure at £10 per ton (as against £4 10s. 0d. normal price) and every other kind of fertilizer correspondingly dear, only the most wealthy growers are inclined to indulge their orchards in this way.—*South African Fruitgrower*.

The following item from the Dallas News is reprinted from Tropiko, the bulletin of the Porto Rico Fruit Exchange: "This state, which was noted for having the largest peach orchard in the country, is gradually losing its prestige as a peach state. The Standard orchard at Scottsville, which was set out and cultivated by the Verhalen Brothers, is like the others, losing its grip. The big Standard orchard will soon be no more. Nearly 100 axmen have been busy this week cutting down the thousands of peach trees. The entire orchard has been leased by B. M. Baldwin, who will cultivate more than 2,700 acres in cotton and corn next year. It has been understood for some time that the orchard was not a paying proposition and the Standard was the last of the big orchards in this country to be abandoned."—*Big "Y" Bulletin, Yakima*.

One of the greatest pleasures of past generations was the pleasant thoughts of early days at the old homestead. In England there is many a home which has been handed down from father to son, until the years that it has been occupied by the same family runs into centuries. In America a generation or two ago old homesteads were common, but within the last quarter of a century the lure of health, wealth, and adventure have almost made the people of the United States a nation of shifting families. There is a great distinction between the words "shifting" and "shiftless." A shifting family is not a shiftless one but it does seem a pity that when the children of the thousands of shifting families reach manhood and womanhood, that in retrospection they cannot look back to any certain locality and no certain homestead and say "it was there that I spent my childhood."—*Southern Fruitgrower*.

The severe freeze that occurred in the middle west April third, fourth and fifth damaged the fruit crop more or less. Growers, however, have been prone to consider their losses much greater than in all probability they actually are. In the great majority of orchards that were injured to a certain extent there are still plenty of fruit buds left to produce a good crop of fruit, if the orchards are handled properly the rest of the season, and if no particularly unfavorable weather occurs later. Mention is made of this fact, by V. R. Gardner of the University of Missouri College of Agri-

culture, particularly at this time, because growers should be cautioned not to discontinue spraying on account of the injury that has been done by the freeze. Spraying should be even more general than before, so as to protect from injury the blossoms that are left, and thus more nearly insure a good crop.—*Missouri College Bulletin.*

Blossom Time Made a Festival

Apple blossom time in the Wenatchee Valley, Washington, in the Hood River Valley, Oregon and prune blossom time in the Willamette Valley, Oregon, were fittingly celebrated in these various districts this year. The commercial organizations of all of these sections invited the residents of the Pacific North-



Young Hood River apple orchard in bloom.

west to visit the orchards and hundreds of visitors took advantage of the occasion.

In Oregon processions of automobiles went from the city of Portland to Salem and Hood River while scores of machines full of visitors made the trip to Wenatchee from many sections in Washington. While each springtime season in recent years has seen many visitors in Northwest orchards during blossoming time the movement took on a wider significance this year than ever before.

An Innovation in Tractors.

The Midwest Utilitor Company, which handles a small type of tractor with the control centered in two handles similar to those on a plow, has established headquarters in Portland. The company is headed by R. H. Butler, E. R. Wells is vice-president and Ralph Krows, general sales manager. The field of operation of the company in regard to the Utilitor are the states of Oregon, Washington and Idaho.

While the Midwest Utilitor is adapted to almost any kind of cultivation of crops and can also be used as a stationary engine, it is particularly adapted to the needs of berry growers, nurserymen, truck raisers and florists. In operating it the operator grasps the two handles the same as on the old-fashioned plow and follows the tractor, just the same as the horse-drawn implement is followed. The control in the handles is on the same principal as that in a motorcycle. When it is used for mowing a seat is provided.



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Millions of germs breed in it. They, with tartar, are the chief cause of pyorrhea.

Very few escape

Very few people have escaped some of these tooth troubles, despite the daily brushing. The ordinary tooth paste does not dissolve film, so the tooth brush has left much of it intact.

Dental research has for many years sought a way to fight this film, and the way has now been found. Many clinical tests have amply proved its efficiency. And now leading dentists everywhere are urging its adoption.

The method is embodied in a dentifrice called Pepsodent. And millions of people are now enjoying its benefits.

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The Pepsodent results are quick and apparent. Everyone who sees them will desire them. So, to spread the facts, a 10-Day Tube is sent to anyone who asks.

Pepsodent is based on pepsin, the digestant of albumin. The film is albuminous matter. The object of Pepsodent is to dissolve it, then to day by day combat it.

A new discovery has made pepsin possible. Pepsin must be activated, and the usual agent is an acid harm-

ful to the teeth. But now a harmless activating method enables us to constantly fight the film coat in this way.

Send the coupon for a 10-Day Tube. Note how clean the teeth feel after using. Mark the absence of the viscous film. See how the teeth whiten as the film-coat disappears.

Do this now, for few things are more important. The results may be life-long in extent. Cut out the coupon so you won't forget.

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Device Shows that Cool Fruit Keeps Better

A MECHANICAL apparatus has been devised by investigators of the United States Department of Agriculture which proves scientifically that, other things being equal, it is preferable to pick such small fruit as strawberries, cherries, and raspberries in the early morning while it is still cool, particularly if the fruit is to be kept some time or shipped a considerable distance. The advantage of early picking lies in the fact that when cool the epidermis, or skin, of the fruit is considerably tougher, generally speaking, than when warm, and so is less easily bruised, as shown by tests. Similarly, the skin of fruit immediately after it has been cooled is more resistant than it is at an

ordinary room temperature. However, after fruit has been in an ice box more than 24 hours, the resistance of its skin is in some cases not so great as that of freshly picked fruit, which has been cooled quickly to ice-box temperature. It seems possible, therefore, that the storing of fruit tends, after a time, to make the epidermis more tender and more easily ruptured.

The apparatus, while having many distinctive features, is a modified Jolly balance. It consists of an upright metal standard from the top of which an arm projects to one side supporting a sensitive coil spring. Attached to the lower end of the latter is a metal rod that passes through a glass tube, the latter

being held in place by an arm attached to the upright. A hair line on the tube and on the metal rod make it possible to determine the point at which tension on the spring balances a given weight. At the lower end of the metal arm a glass rod is attached, to which is cemented a small glass needle with a rounded end.

In operating the apparatus the fruit is placed on the stand of the instrument in a holder, and the stand so adjusted that the surface of the fruit just comes in contact with the tip of the glass needle, when the hair lines on the metal rod and glass tube coincide.

The tension on the spring is released by means of a rack and pinion adjustment permitting the standard to telescope slowly, thereby lessening the tension of the spring. The operator is able to tell the instant at which lessened tension permits the needle to puncture the fruit, because the movement of the needle is indicated by the movement of one of the hair lines. When this takes place he at once stops the telescoping of the standard. Then, by reading the scale on the side of the instrument the weight required to balance the tension on the spring is determined. The weight of the glass rod, minus the weight necessary to balance the tension on the spring, gives the pressure of the needle on the fruit at the time it punctures the skin.

A large number of tests were made with fruit when it was freshly picked, and cooled after washing it in tap water, also after the fruit had been kept in a refrigerator for 24 hours, and again after cooled fruit had been brought to room temperature.

The tests confirm the wisdom of a practice common in many regions, namely, the picking of berries in the morning when still cool. The presence of dew does not make the berries more susceptible to injury than dry ones.

It seems probable that the increased resistance of the surface of small fruits to mechanical injury when cool, has been an important factor, not fully appreciated heretofore, in the improved keeping quality which results in prompt cooling and refrigeration.

Standard Apple Box Retained.

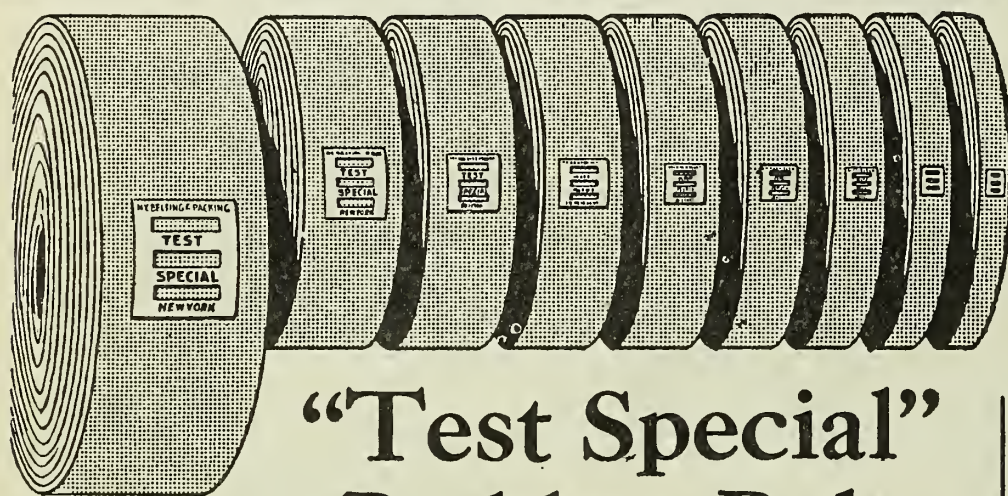
Owing to the strong protest made by Northwest apple growers against changing the nature and size of the standard apple box as used in the Pacific Northwest, proposed legislation to that effect has been dropped. The protest was made in the nick of time as the committee in Congress having the matter in charge was getting ready to report out a bill making the dry bushel measure the standard for the Northwest as well as all other sections of the country.

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Northwest Fruit Notes from Here and There

OREGON.

Prices for canning cherries were fixed at The Dalles April 17, when a contract was closed between the local cherry growers' union and the Libby, McNeil & Libby Canning Company, at 15 cents per pound. J. D. Riggs, manager of the cherry growers' union estimates that the crop of cherries at The Dalles this year will be 1,000 tons.

Pools recently closed on several varieties of apples handled by the Hood River Apple Growers' Association show that the high and low prices received were as follows: Jonathans, \$2.28 and \$1.33; Delicious, \$2.91 and \$1.51; Northern Spy, \$2.16 and \$1.45; Wageners, \$1.95 and \$1.34.

A local nurseryman at Hood River reports that a 200-pound shipment of seedlings that before the war cost \$25, according to present prices for nursery stock, cost him \$536. Notwithstanding this big increase it is claimed by some of the leading nurserymen that stock for planting has not yet reached the maximum figure.

Although loganberry prices are soaring the Salem Statesman, which has been keeping close watch on offers that are being received for these berries at the hub of this industry, says that it has been unable to find that more than 12 cents has been actually offered for loganberries this year. Predictions are being freely made, however, that they will go to 14 cents before the season is over. While the prospect for record prices for "logans" seems bright, some of the larger and older growers say that it will hurt the industry to boost the price so high that they will be out of reach of the consumer. A new feature that is reported to have been injected into the loganberry industry this year is the arrival on the coast of eastern buyers who are said to be buying these berries to be packed in barrels and shipped to the Atlantic coast in refrigerator cars to be processed in the east. Berry growers generally believe that prices considerably higher than those offered at the present time will prevail this year.

The market for strawberries in the Willamette Valley is reported to have been opened at 14 cents for eastern shipments while local canneries are quoting prices around 12 cents. Prices for berries on five and ten-year contracts

that have been offered are six cents a pound for strawberries, five cents a pound for loganberries, four cents for gooseberries and eight cents a pound for raspberries. These prices it is stated are the minimum, and with a stipulation in the contract that if open market conditions warrant it higher prices will be paid.

In order to secure the greatest degree of co-operation between the prune growers of Oregon and Washington, growers and managers of the Oregon Growers' Cooperative Association and a similar concern with headquarters at Vancouver recently held a conference in regard to marketing this year's prune crop. By keeping in close contact during the coming season the two organizations will work in harmony in regard to the several features necessary to place the prunes of Clarke County and the Willamette Valley on the market to the best advantage.

A good deal of sickness that has developed during the winter throughout the Northwest among horses and cattle in orchard districts through the eating of hay that has been taken from orchards that have been sprayed with arsenate of lead is causing experiments and investigations to be made by experts at the various agricultural colleges. The matter was brought to a head by the death of two horses at Hood River. Dr. J. W. Kalkus, head of the veterinary department at the Washington Agricultural College at Pullman, says that in its acute form the disease manifests itself suddenly and resembles very much a typical case of respiratory influenza. The course being recommended at present by these experts is for the orchardist to exercise greater care in seeing that spray apparatus is in good condition and to avoid allowing any large amount of spray to be deposited on intercrops that are being grown in orchards.

Following a meeting of the Oregon Growers' Cooperative Association recently held at Salem, it was announced that fruit packing and processing plants aggregating in cost more than \$100,000 would be built or taken over by the association. A prune packing plant will be built at Myrtle Creek and another at Riddle, while a plant will be erected at Grants Pass, for the handling of apples and pears. Com-

bination driers and prune packing houses will be constructed at Sheridan and Dallas. At Yamhill the association has already taken over the Drager prune drying and packing plant. J. O. Holt, cannery and packing house manager for the association, who has made a distinct success in managing the plants owned by the Eugene Fruit Growers' Association, will have charge of the plans for the new plants and announces that they will be built according to a standardization policy adopted by the growers' organization. This will include everything that is modern in the way of equipment to handle the various products which the association is to market.

At the annual meeting of the Hood River Apple Growers' Association, at which plans were discussed for the coming season the keynote was declared to be a more rigid inspection of fruit and a stronger enforcement of packing rules. Although the association handled the largest crop of fruit in its history the cost of handling was reduced per box below that of any previous year and the finances of the organization shown to be in a very satisfactory condition. The new directors elected are: J. C. Porter, R. J. McIsaac, E. W. Birge, A. F. Bickford, J. H. Jeffrey, J. D. Guttery, A. J. Graff, C. K. Benton, J. R. Nunnemaker, O. B. Nye, A. C. Staten. A. W. Stone remains as manager and W. C. McCullough, sales manager.

Probably one of the largest plantings of prunes and nuts made in the State of Oregon of late has just been completed by Percy Bros., in the Willamette Valley section. In the planting there are 3,000 filbert trees which is believed to be the largest tract of filberts in Oregon if not in the Northwest. The entire tract is owned by eastern people who have engaged the Percy Bros., who make a specialty of nuts, and fruits also, to handle and manage it for five years.

To demonstrate how a model fruit farm should be conducted, 10 acres of fruits and vegetables that can be used by a cannery will be planted near Albany. The farm will be used to teach prospective and actual fruit growers in that section the proper methods of fruit and vegetable growing. Stockholders in the Puyallup and Sumner Fruitgrowers' Association, which has a cannery at Albany, will finance the farm.

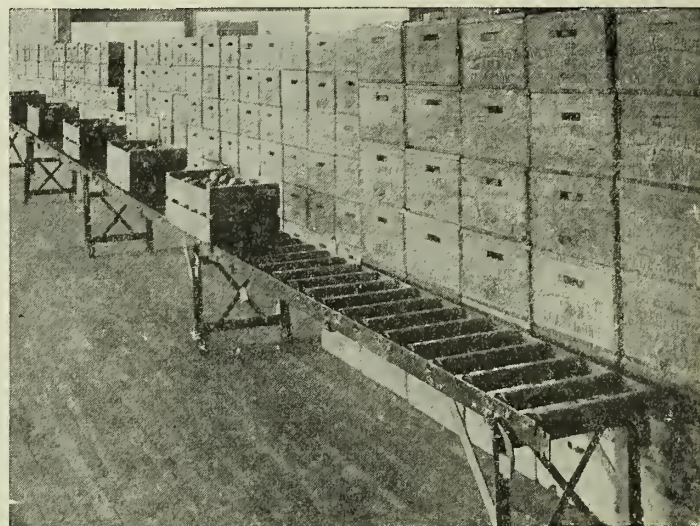
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A novel way in which the Rupert Canning Company encourages and coöperates with fruit growers who do business with this company is to have them meet at the plant of the company located at Newberg once each year and have a "berry and small fruit growing school." The school lasts several days and experts in fruit and vegetable raising instruct and advise the farmers. The company turns a portion of the cannery into a large social hall and cafeteria and the farmers are the company's guests while attending the school. Much benefit has been derived by both the cannery and the farmers by reason of the school.

Thirty enthusiastic fruit growers representing all parts of Josephine County met recently at Grants Pass, Oregon, when a county-wide fruit program of the farm bureau was taken up and the goals set for 1920 approved. The question of organizing a county fruit growers' association was referred to a committee with instructions to formulate plans of organization to be presented at an early date. The meeting was presided over by Clyde E. Niles, president of the Farm Bureau, who spoke in general of the necessity of the various communities getting together on fruit problems of county-wide interest. The Farm Bureau fruit program of work for 1920 by organized communities was presented by the county agent. The program of work as outlined was endorsed and W. T. Reed pointed out the necessity of close coöperation on the part of the fruit men in working out the adopted program. The matter of perfecting a county organization of fruit growers to consider problems of local interest and those not handled by the state organization was discussed from various angles. The committee appointed consisting of W. T. Reed, Douglas Wood and C. H. Eisman, will formulate plans of organization and present same in the near future. The matter of preferred stock in the Oregon Growers' Association was presented by Mr. Niles and a number of the fruit men present signed up. J. O. Holt, packing manager of the Oregon Growers' Association has been in Grants Pass and has discussed plans for the construction of a packing plant.

WASHINGTON.

According to an estimate made by District Horticultural Inspector E. G. Wood of the Walla Walla district, most of the peach trees in that section were winter-killed. Apricot trees largely met the same fate while sweet cherries were injured to the extent of 33 per cent of the planting. The only part of the district to escape damage was a small belt along the Snake River between Bishop and Almota. Damage to apple trees is reported as spotted.

Unless H. M. Gilbert, one of the oldest orchardmen in the Yakima Valley is mistaken the apple crop in that section will be one of the largest in its history this season. Mr. Gilbert made this statement recently after an extended investigation of the valley.

A survey made recently in the Kennewick district shows that there is fully 100 acres more under irrigation in that section this year than last.

The total amount received in Yakima County for fresh and dried and canned fruit for the past season was over \$22,000,000.

A five-acre orchard located near the city of Wenatchee, highly improved and on which there is a modern dwelling recently sold for \$20,000, according to the Wenatchee Advance. The property belonged to George Scheidmantl and for a long time has been one of the show places at Wenatchee. Owing to the intensive methods used the yields from it have been very heavy.

It is estimated that apple boxes will cost Yakima growers \$1,000,000 more this season than last. Twenty-five to 28 cents is being asked for apple boxes and 22 to 25 cents for pear boxes. The opening price last year was 13 cents with 22 cents at the peak of the season.

Papers filed at Walla Walla reveal the sale of the Baker-Langdon orchard, a 600-acre tract of apple trees in hearing to the Stanton Investment Company, composed principally of Ohio capitalists. The price is \$1,050,000. The orchard was planted about eleven years ago and is the biggest commercial orchard in the valley. John W. Langdon will retain an interest in the company and continue as manager, it is announced. The company intends to construct a big cold storage warehouse this year and make other improvements. Production of the orchard this year is estimated at not less than 300,000 boxes and within five years at 750,000 boxes or 1000 carloads of hoxed apples.

Stanley Armstrong, formerly state horticultural inspector in Spokane, has been appointed district field representative of the Northwestern Fruit Exchange in the Walla Walla territory. In establishing a Walla Walla office, the exchange will serve shippers throughout the region including Kennewick on the west, Lewiston and Clarkston on the east, Columbia points and Oregon on the south and embracing all of the Walla Walla, Milton, Freewater, Waitsburg, Dayton and Touchet districts.

Northwestern fruit growers rallied in defense of their standard apple hox when it became known that a congressional committee was likely to adopt the bushel basket as the standard for the United States. Eastern growers who market their apples in barrels are declared to be behind the move which would have a tendency to discredit northwestern hoxed apples in the eastern markets. M. L. Dean, state commissioner of agriculture at Olympia, wired the agricultural bureau of the Spokane Chamber of Commerce as follows: "House bill 12,350 proposes to standardize apple boxes. We have insisted upon the recognition of the northwestern standard and that any subdivision like a half-box or multiple like a hox and one-half must be figured on the

northwestern standard. The department of agriculture favors a standard on the dry bushel basis with a provision that the northwestern hox shall not be illegal. This creates double standards and makes the present box a side issue. The committee is inclined to the dry hushel basis. Suggest you wire your congressman, insisting on the northwestern standard only." The Bureau, the Spokane Fruit Growers' Company and the Earl Fruit Company immediately dispatched wires east urging action along the line suggested by Mr. Dean. As a result the bill for the new container was killed. Last year Idaho, Washington and Oregon produced 29,014,000 boxes of commercial apples as against a total for the United States of 73,200,000 bushels.

Joseph Di Giorgio of New York, president of the Earl Fruit Company of the Northwest, and known in the east at the "American Banana King," will be in Spokane next month on an annual tour of inspection of his apple and other interests in the Northwest. While in Spokane Mr. Di Giorgio will discuss with officers of the Palouse Corporation plans for the establishment of a dehydrating plant in Spokane County to handle cull apples. He is loaning the corporation \$75,000 this year. The

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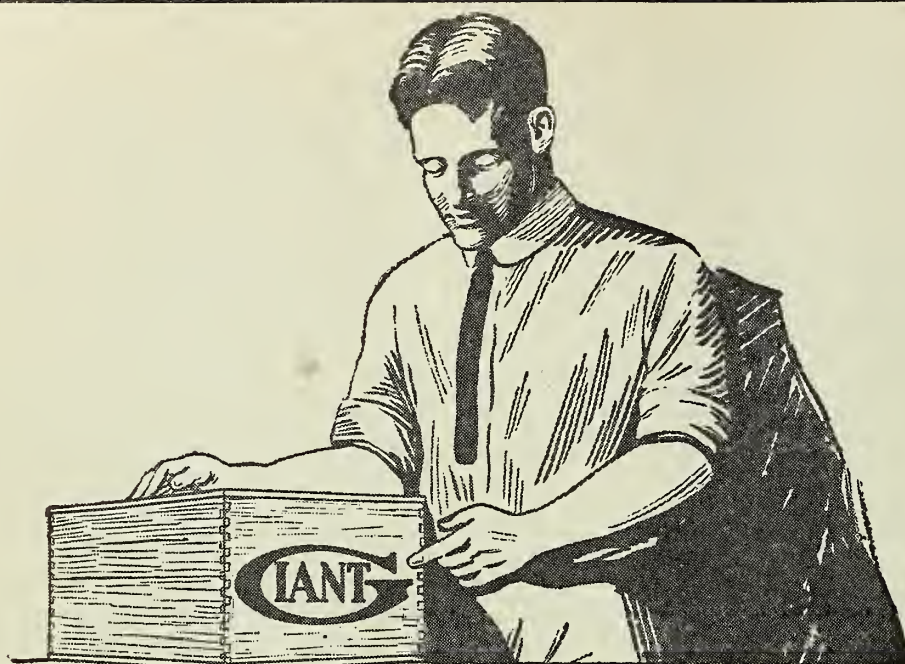
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Portland, Oregon, U. S. A.

Earl Company will sell the Palouse organization's tonnage this season for the first time. The problem of disposing of culls is becoming serious and last year local cider plants could not handle them and tons were shipped out of the district to be worked up in distant by-product plants. Mr. Di Giorgio has had considerable experience with dehydrators, operating one of the largest in the Northwest in Southern Idaho, for the treatment of prunes.

The second largest orchard sale in the history of North Central Washington was completed at Wenatchee, when the American Fruit Growers, Incorporated, took over the 160 acres owned by the Wells & Wade Orchard Company at Malott, paying \$156,000. There is about 110 acres of orchard just coming into bearing and 20 acres in alfalfa included in the tract purchased. The orchard was set out to winter apples in 1912 and produced 24,000 boxes last year. It was improved with a modern packing house and also with a concrete warehouse, located on the railroad at Malott.

Anticipating higher box prices this season, the Spokane Fruit Growers' Company has 200,000 boxes in its warehouse for the 1920 apple crop and has closed contracts for the delivery before October 1 next of 750,000 boxes. Box manufacturers are asking double the opening prices at this time a year ago. At that time some makers contracted to supply boxes at about 12 cents. Present prices run from 25 to 27 cents. The highest figure last season was 18 to 20 cents. The company this year will need approximately 375,000 pounds of paper for wraps in addition to labels for each box. This material is already ordered by the Skookum Packers' Association for all its members. The company buys spraying materials and nails and is placing orders and in some instances accepting delivery. Nails are scarce and higher than last year. Arsenate of lead, the biggest item in spraying costs is a little cheaper than it was last year. Most of the lime sulphur used against scale and scab is mixed by the company for the growers at the branches. Sulphur is a little cheaper than a year ago, but lime is slightly higher. Growers in the Spokane Valley have a new pest to fight this year in the leaf roller, which appeared throughout the valley for the first time last year. It must be combatted with miscible or soluble oil, which is sold to the growers at \$22 per barrel of 50 gallons.

The heaviest shipment of apples in one day from the Wenatchee district since the first of the year went forward recently when 119 cars were dispatched to eastern points in two solid trains. One was made up of 60 box cars, practically all loaded in Omak, and the other was composed of 38 refrigerators and 21 box cars picked up all over the district. Wenatchee has shipped over 11,400 cars of apples this season.

Homer J. Shinn of Spokane, has sold his 520-acre Keystone Fruit Company ranch at Entiat to J. Ellis Slater, a commission man and capitalist of Chicago and A. E. Brauns, a fruit and lumber man of Iron Mountain, Michigan, for a reported price of \$250,000. The Keystone brand and ranch has been owned by Mr. Shinn for 13 years and is one of the show places of the Entiat district. The water rights are perpetual and the ranch is irrigated by trough flumes from the Entiat river. Three hundred and ten acres are under cultivation, chiefly in apples and pears. The trees, planted by Mr. Shinn, are six or seven years old. The apple yield last year was 45,000 boxes.

W. A. Darling and J. S. Cardinal, with associates, have incorporated as the Wenatchee Fruit and Warehouse Company of Peahstien and will begin the construction of a warehouse which is estimated to cost \$45,000.

Skagit County in Northwestern Washington, is experiencing a big boom in the small fruit industry. Between 1500 and 2000 acres have been planted this spring and approximately an equal number will be set out next fall and spring. The plantings are about equally divided between strawberries, raspberries and loganberries and there has also been considerable planting of blackberries. In the Skagit



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River Valley there are thousands upon thousands of acres of sandy loam, the ideal berry soil, a large part of which when cleared, will probably be set out to small fruits. Interest has also been aroused in sour cherries and already quite an acreage of these has been put in. The people of this part of the state are also beginning to take more and better care of their numerous small home orchards. This is due to an entirely new market resulting from the establishment of several canneries in the county. Construction of independent canneries has already begun both in Sedro Woolley and in Burlington while next year the Everett Canning Company, anticipates the erection of a branch cannery in Mt. Vernon.

MONTANA.

The satisfactory prices received for the 1919 crop of apples have caused orchardists to center their attention upon their orchards. The mild weather since December has permitted most of them to complete pruning operations and an extensive cultural program is being planned. Special consideration is being given to the use of leguminous cover crops for the purpose of enriching the soil. Much of this is caused from the results of the cultural experiments conducted on the horticultural substation located in the Bitter Root Valley. As these have been in operation since 1908 some interesting as well as valuable information is available. One need not hesitate to decide the value of turning under a few crops of clover or peas—a glance at the trees in the different plots is sufficient.

State Horticulturist Wood is exerting every influence possible to secure adequate spraying. As outbreaks of codling moth appeared in several widely separated districts in Western Montana last year, attempts are being made to eradicate them and uphold the fame of Montana as the home of the "wormless" apple.

An outbreak of the "apple leaf roller" in the upper end of the Bitter Root Valley is receiving special attention. Already a car of oil for use in spraying has been ordered, and an attempt will be made to check the further spread of the insect. To assist in the control of this and the codling moth several spray outfits have been purchased by the state.

A breeding cage is being constructed on the horticultural substation to assist in the study of the life history of the codling moth and other insects of economic importance in Montana.

At present growers are receiving from six to eight cents per pound for potatoes, and contracts are being signed for the 1920 crop at from \$30 to \$35 per ton. A large acreage is expected.

The heavy rains which have fallen during the past month have resulted in an abundance of moisture in the soil. Conditions are ideal for a bumper crop both in the irrigated sections and on the dry-land farms.

What They Are Doing in California

The California Associated Raisin Company last year shipped to points in the United States 322,150,067 pounds of raisins.

The Hinkley-Beach Canning Company, which has secured five acres adjoining the townsite of Sanger, California, will construct an extensive canning plant in which they will handle all kinds of fruits and vegetables.

A recent investigation of crop damage to almonds in California is said to show a more serious condition than was at first reported. The damage is due to lack of rainfall and frost. In most districts the damage is reported as high as 50 per cent while in some of the others it is reported that there will not be enough nuts to pay for harvesting. The reports state that while some new acreage will come into bearing this year it will not be enough to offset the loss on old-bearing trees.

The announcement is made that the Guinda Almond Growers' Association has unanimously voted to affiliate with the California Almond Growers' Exchange. This association has heretofore been marketing almonds through other sources. The members of the Winters Dried Fruit Company also voted unanimously to affiliate with the California Almond Growers' Exchange and as a result the major portion of the almonds marketed through the Winters Dried Fruit Company heretofore, will in the future be marketed through the Winters Almond Growers' Association, a unit of the exchange. This will give the exchange very

close to 100 per cent of the almonds in those sections. Since January 1, approximately 500 new members have been secured, giving the exchange some considerable increase in its control of the crop.

On account of the unusually large numbers of adult grasshoppers depositing eggs in many localities in the late summer months in California in 1919 and the mild winter and lack of rains, California bug experts are looking for one of the most severe grasshopper seasons in the history of the state. The State Department of Agriculture has already taken hold of the matter through its office of pest control and will wage a vigorous warfare against these pests from now on.

The California Vegetable Union has moved its headquarters from Los Angeles to Sacramento, having contracted for the immense vegetable output of the Sutter Basin lands. The union expects to ship 3,000 carloads of vegetables out of Sacramento within the next year. The tremendous growth of the vegetable growing industry in Sacramento Valley led the union to its decision to establish headquarters in Sacramento, according to Thomas O'Neil, president.

The California Fruit Exchange announces the shipment of the first box of California cherries to the eastern market, on April 10. This is a week earlier than last year. The cherries were shipped from Vacaville.

California fruitmen, canners, shippers and all those who are connected with the fruit business in any way have every reason to feel

optimistic over the coming crop, says Charles B. Bills of the California Fruit Distributors. Bills has just returned from a trip of inspection through the fruit districts and says he has never seen conditions more ideal than they now are, with every indication of a bumper crop.

The strawberry season in the Sacramento Valley is under way—fifteen days earlier than last year. Carload shipments started on May 1 and indications are that prices will be about the same as last year. The crop will be considerably larger than last year, however, the production in the Florin district alone being estimated at 15,000 crates.

Cannery Notes

A. Rupert & Company, Incorporated, which is extending its already large operations in the canning industry took over during the past month the cannery of the Umpqua Valley Growers' Association at Roseburg. The Rupert Company also took over \$41,000 worth of canned goods which were on hand and agreed to find a market for them. The company made the deal according to the report, with the understanding that local interests take \$20,000 worth of the preferred stock. Should the Rupert Company finally close the deal it will erect a large warehouse in connection with its canning operations at Roseburg.

With the shipping of a carload of canned apples to San Francisco it is announced that the entire product of the cannery at Sunny-side, Washington, has been disposed of.

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The strawberry season was started in the Sacramento Valley April 15th. There is a 25 per cent increase in acreage over last year. Most of the crop has been contracted for at 14 cents per pound.

The new officers of the South Bend Canning Company who were recently elected are: Ben Armstrong, vice-president; A. P. Pederson, vice-president; E. Pederson, secretary; Theodore Myers and F. A. Hazeltine, trustees.

In order to do business on a much larger scale than heretofore the Rogue River Valley Canning Company, at Medford, is installing more equipment and providing for increased space. Having purchased additional land, the company is now building a new warehouse and cold storage plant 50x75 feet. The company has also purchased an additional half block near its new warehouse for a new cannery site.

The Brownsville Cannery Company, one of the oldest and most successful in Oregon, is reported to have been purchased by the Graves Cannery Company at Sheridan. The Brownsville Company has two branches, one at Forest Grove and one at Corvallis and both establishments have been a financial success.

Indications are now that Canby, Oregon, will have a cannery this year to take care of the berry crop in that section. At a recent meeting there growers were urged to plant additional acreage. The meeting was addressed by W. R. Scott of Albany, connected with the Puyallup and Summer Fruit Growers' Canning Company who stated that if sufficient tonnage was secured a cannery would be erected at that point.

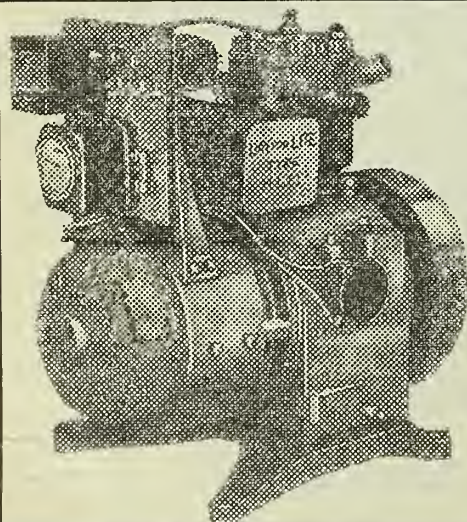
The largest and most modern lemon processing and packing plant in California has just been completed at Maxwell, Colusa County. It will handle the product from the greater portion of the Sacramento Valley, particularly the Mills Orchard Company's property, which has 700 acres of lemon trees.

The seven largest asparagus canneries in the world, located in Sacramento County's delta section, started operations for the season April 15. The 1920 pack will be in excess of 750,000 boxes. The price of unsorted asparagus to the owners ranges from six to eight cents a pound—the highest ever paid in the history of the industry.

Wine grapes in this section are being contracted for at as high as \$40 a ton for the 1920 crop. But none will be used in wine making. The greater part will go toward manufacturing the beverage that Bill Bryan made famous, while thousands of pounds will be dried.

According to the American consul at Tientsin, China, a considerable trade is being built up in that district for American canned goods. The American goods are sold in competition with the British, French, Australian and Japanese products. The American fruits that are imported are apricots, apples, cherries, grapes, plums, peaches and pears, but more peaches and pears are sold than fruits of any other kind. Dried prunes, apricots, apples and peaches are imported for the use of foreigners. The French and British goods are put up in the same sized tins as the American goods, namely, two and one-half pound tins which hold about one quart and are packed two dozen cans in a case. As to quality, American canned goods are quite equal to those from other countries on sale in this city. The packing and labeling of American goods is quite as attractive as that used in connection with the goods of any other country. About 60 per cent of the canned fruit sold in North China is what is known as second quality; that is, the syrup is of light and inferior grade and the fruit is not of selected quality. The British jams, jellies, and marmalades are by far the most extensively sold of any brands on this market, not only to foreigners, but the Chinese also buy in fairly large quantities. In addition, French jams and preserved fruits have a good sale. The latter are put up in one-pound glass jars, while the former are in one-pound tins. The French jams are put up in a more attractive manner and sell at a slightly higher price than the British. Crystallized fruits in glass bottles have also a limited sale.

The Oregon Growers' Cooperative Association which is rapidly getting into shape to handle the large tonnage of fruit placed under its management announces that it has taken over packing houses at Medford and Roseburg. The price paid for the Medford property was \$50,000.



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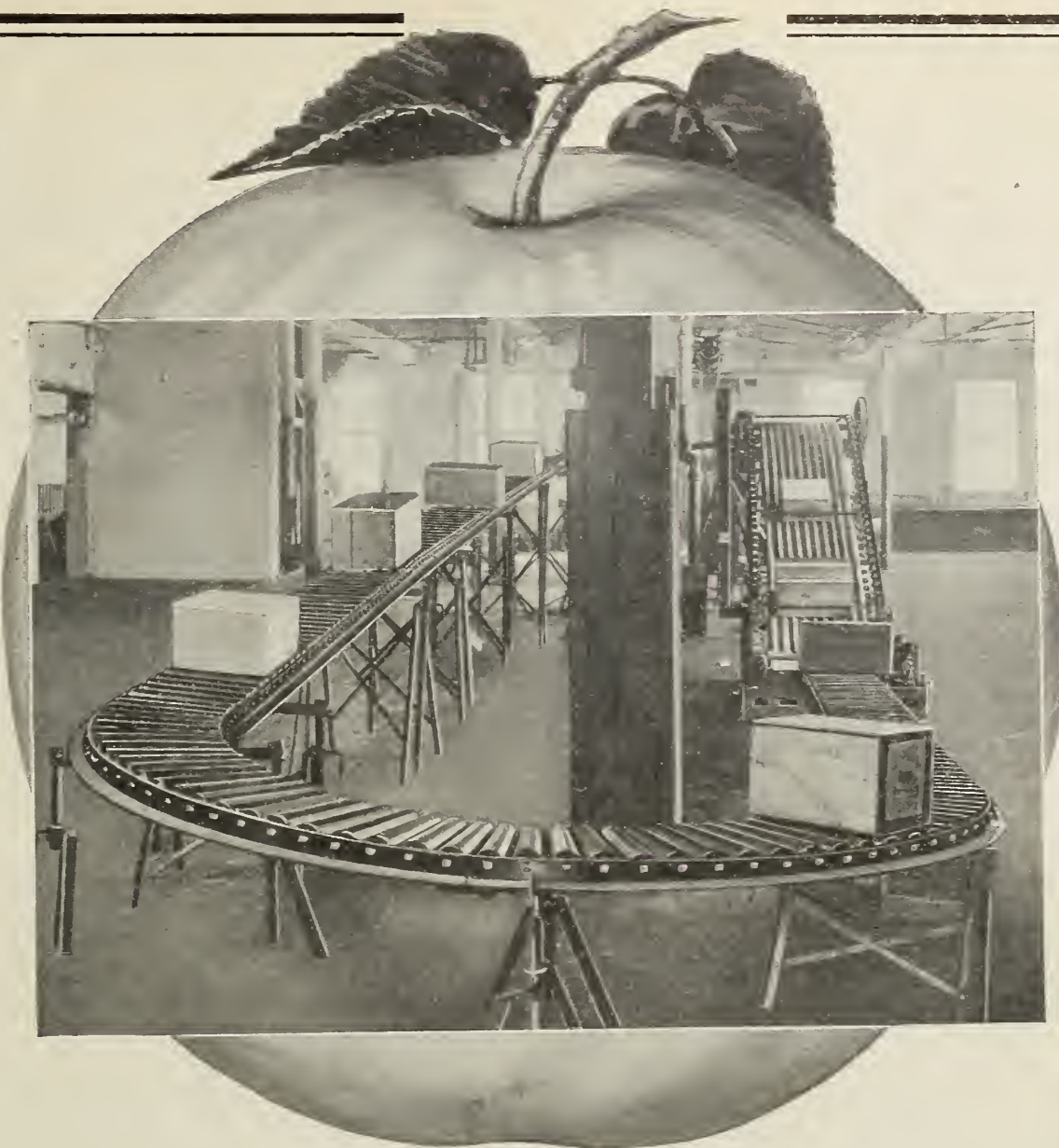
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Treatment of Woolly Aphid, Etc.

Continued from page 12.

cessary and the spraying can be done at any time of the summer. There is little to be gained by spraying when the trees are dormant or in early spring. Possibly the best dates for treatment would be either in early June when the spring migrants have reached the apple and before the aphids have had a chance to penetrate to the roots, or in late August before the fall migrants have flown away. Distillate emulsion or proprietary summer sprays of miscible oil or the customary aphid spray of nicotine extract plus soap may be utilized against the woolly aphid. Even in case of light infestation, such amateur treatments as swabbing colonies with kerosene, gasoline or melted tallow may suffice.

Recent experiments by the U. S. Bureau of Entomology have developed a fairly successful treatment for the root form. This consists of soaking the ground around the infested trees, using a 1-10 of one per cent water solution of carbon disulphid. This is a saturated solution and can be prepared by injecting the carbon disulphid into the water and agitating until dissolved. The woolly aphid rarely occurs more than a foot below the surface and thus is within easy reach of this treatment, but the ground must be wetted completely under the tree as far from the trunk as the length of the branches. Only partially successful have been soil treatments with kerosene emulsion, lime sulphur, tobacco dust or cyanide solution.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

of the Better Fruit, published monthly at Portland, Oregon, for April 1, 1920.

State of Oregon, County of Multnomah—Before me, a notary public in and for the state and county aforesaid, personally appeared D. L. Carpenter, who, having been duly sworn according to law, deposes and says that he is the business manager of Better Fruit, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, embodied in section 443, postal laws and regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:
Publisher, Better Fruit Publishing Co., Inc., 800 Oregonian Building, Portland, Oregon.
Editor, E. E. Faville, 800 Oregonian Building, Portland, Oregon.

Managing editor, none.
Business manager, D. L. Carpenter, 800 Oregonian Building, Portland, Oregon.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

Owner, Better Fruit Publishing Co., Inc., Portland, Oregon.

Stockholders, D. L. Carpenter, 800 Oregonian Building, Portland, Oregon.

E. E. Faville, 800 Oregonian Building, Portland, Oregon.
A. W. Stipes, 800 Oregonian Building, Portland, Oregon.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner, and this affiant has no reason to believe that any other person, association or corporation has any interest, direct or indirect, in the said stock, bonds or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (The information is required from daily publications only.)

D. L. CARPENTER,
Business Manager.

Sworn to and subscribed before me this 30th day of March, 1920.
(Seal.) H. R. SHAW,
Notary Public for Oregon.
(My commission expires September 21, 1921.)

In treating the soil it is suggested to scrape back the upper few inches from the tree, and not to have the ground soaked with irrigation water before applying the carbon disulphid.

To prevent migration back and forth between the underground and branch forms, which takes place at any time during the summer, some growers advise banding the trunk with strips of burlap painted with a mixture of equal parts of rosin and castor oil melted together. Packing a good layer of loose sand around the base of the trunk is said to accomplish the same result since the aphids are too delicate to force their way through sand or compact earth and their movements are limited to cracks in the ground.

In conclusion the part played by the elm tree in the life cycle of the woolly aphid must not be overlooked when planning the control of the pest. Should fall migrants be observed flying to nearby elms, should winter eggs be discovered in the cracks of the bark, or should the opening leaves develop colonies of honey-dewed plant lice in the spring, the logical course is to check the insect before it spreads to the apple trees. The same kerosene emulsion may be used in the early spring against the leaf-curling generation on the elm.

Bits About Fruit, Fruitmen and Fruitgrowing

According to the Market Reporter, published by the U. S. Bureau of Markets, the Northwestern apple season, now closing, has been the greatest, from the viewpoint of production, in the history of the box apple industry. Two years ago almost 23,000 cars were shipped from the four states, Washington, Oregon, Idaho and Montana. This season, final shipment reports will probably show a total of 33,000 cars, which is far in excess of what was expected when the season opened. Dealers anticipated a comparative shortage of apples, taking the country as a whole. Remembering the heavy export demand last spring and the high prices they competed actively in producing sections. Buyers paid unusually high prices and the growers reaped a golden harvest. Final figures will show that the Wenatchee district shipped over 11,000 cars, Yakima district over 10,000 cars, Southern Idaho about 3,300 cars, Hood River approximately 3,400 cars, Spokane district 2,400 cars and the Walla Walla-Milton-Freewater district 1,200 cars. On March 1 it was estimated unofficially that the Northwest had from 3,200 to 3,500 cars still on hand, mostly in the Wenatchee and Yakima districts. Telegraphic reports of shipments during March showed that 2,200 cars had moved during the month, leaving somewhat over 1,000 cars still at points of shipment.

Shipment of apples to English markets practically ceased the second week in April. This condition was partly the result of the fact that Tasmanian apples are usually due to arrive in England by April 15.

While some of the recent shipments to the British Isles have netted high prices, the season as a whole, has been unsatisfactory. Recent sales of California Newton Pippins have brought \$4.62½ per box, while Ben Davis, Starks, and Russets have brought as high as \$13.19½ per barrel.

The high prices which prevailed during the early domestic market season, together with the difference in exchange, resulted in many of the large operators handling export goods only in limited quantities.

The United Kingdom usually receives fully two-thirds of the total shipments of apples from the United States. In the 1918-19 season the United Kingdom received 1,016,945 barrels out of 1,576,348 barrels exported.

The 1917-18 figures suggest the effect of the shipping and trade embargoes in force at that time. Total exports dropped from 1,739,997 barrels in 1916-17 to 635,409 barrels the following season. Exports during the six months September to February, inclusive, 1919-20, show considerable activity, with total of 757,-

782 barrels compared with 1,077,432 barrels for corresponding months in 1918-19 and 494,747 barrels for same months in 1917-18, but still much below the figures for the same period in 1916-17, when shipments were 1,530,979 barrels.

The New York customs district leads in apple exports with 510,154 barrels in the season of 1918-19 and Massachusetts district ranks second, shipping 411,181 barrels in that season. Shipments from New York and Boston include much stock from some of the more distant producing sections.

H. F. Davidson, owner of extensive apple orchards at Hood River and a New York handler of apple crops from other sections of the Northwest, who recently returned to the coast after an examination of orchards at Hood River is of the opinion that notwithstanding the reported frost damage Hood River can expect another big apple crop this year. The Bartlett pear crop is expected to be light, while the cherry crop is expected to be about normal. Mr. Davidson calls attention to the fact that the warehousing situation at this end of the business must be greatly improved to secure better results and that steps must be taken to overcome the car shortage.

Joseph Steinhardt, the veteran New York fruitman, who suffered an attack of pneumonia following his visit to the Western Fruit Jobbers' Convention at Seattle, is now reported to have fully recovered and to have returned to the fruit marketing game with all his old-time vigor.

The Stark Brothers' Nursery Company, which originated the red and golden Delicious apple, now so well known in the Northwest, have inaugurated a contest to secure extra fine specimens of these varieties of apples. To conduct the contest the company has set aside \$3,000 which it will pay for the best ten specimens from each state in the United States, and from Canada and Mexico for three years. The annual prize in each state and Canada and Mexico amounts to \$20 per year—\$10 for each variety.

A circular letter recently sent out by J. H. Gourley, professor of horticulture at the New Hampshire College says that it is a startling fact that the apple crop in that state has declined from approximately a million barrels per year to about 125,000 barrels and that this decrease has come within a comparatively short time. This decrease Professor Gourley says is due largely to lack of care to the trees and he is calling upon the orchardists of the state to adopt modern methods in the management of their orchards.

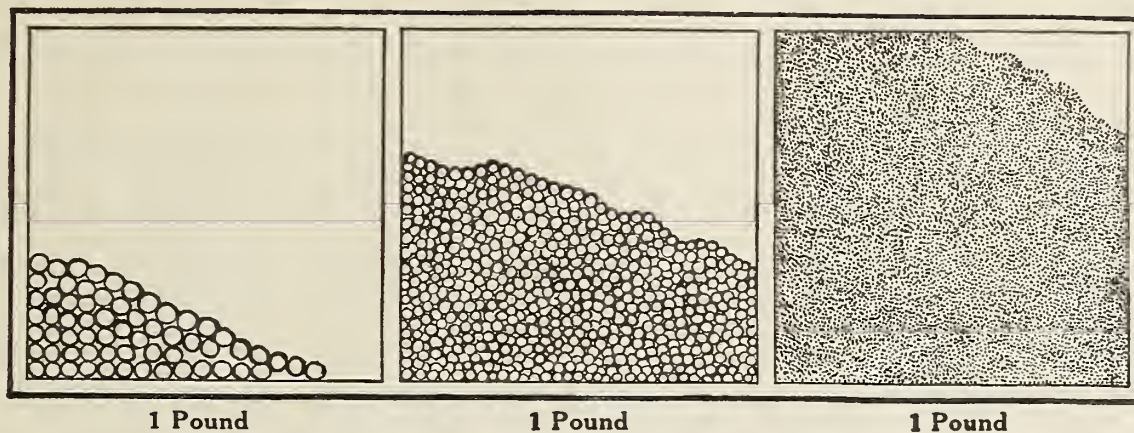
In a ruling recently made by Richard T. Eddy, examiner for the Interstate Commerce Commission, he decided against any distance adjustment of freight rate increases on apples shipped east from the Northwest, as requested by the Public Service Commissions of Washington and Oregon in an action instituted on behalf of the apple industry, when the 25 per cent increase in freight rates generally was made two years ago, according to telegraphic advices received from Olympia.

Examiner Eddy, who heard evidence and argument at Portland last fall, maintains in his findings that Washington apples successfully compete with eastern-grown fruit in New York and other Atlantic markets, despite the increased freight charge from the Northwest, which will amount to 25 cents a hundred pounds, a total freight charge of \$1.25 a box, or 12½ cents a box in New York, added to the present selling price.

The Washington commission's opposition to a blanket increase of 25 per cent ordered by the railroad administration in 1918 was founded on the unequal application of the rate on long hauls and short hauls to competitive points. The 25 per cent increase on the 18-cent rate from Rochester, New York, to New York City amounted to slightly more than two cents, and from Winchester, Virginia, to less than six cents per 100 pounds, while the same ratio imposed 25 cents more on northwestern apples shipped to compete with the New York and Virginia fruit, the Northwest increase amounting to more than the total increased freight charge on New York and Virginia-grown fruit.

By a trip east, Commissioners Blaine and Cleland obtained a modification of the apple rate in 1918, which it was estimated, saved the Yakima and Wenatchee growers a million dollars on that year's crop.

In continuation of this fight, the Public Service Commission sent Assistant Attorney-General Burgunder to Washington to oppose affirmation by the Interstate Commerce Committee of the examiner's findings.



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say, 1 pound of buck-shot, 1 pound of B-B, and 1 pound of fine bird-shot. Then spread each batch out on a square foot of space. Remember, you have the same amount of *lead* in each case—1 pound. But you will see how much greater *spread* and how much closer *cover* the *fine* shot gives. Now apply that example to coarse and fine Arsenate of Lead. Then you will understand how S-W Dry Powdered Arsenate of Lead covers more foliage per pound than any other arsenate of lead spray.

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Winter Injury or Die-Back, Etc.

Continued from page 10.

for the welfare of the tree during the winter. The regular practice of fall irrigation in walnut groves may be considered as a profitable form of insurance since it is impossible to predict the occurrence or the volume of winter rains. We know that frequently the rains are too late and insufficient for the welfare of walnut groves. It goes without saying that trees on a light sandy type of soil are in greater danger of injury from winter drought than are trees on a heavier type of soil. In addition to soil types there are other factors involved in the production of winter injury, such as, the character of the rainfall, the rate and amount of evaporation, temperature, etc.

The growth of a winter inter-crop such as barley, during a normal season may bring about the same adverse soil moisture condition that the dry winter does, unless great care is taken to apply enough water for the needs of both trees and inter-crop. For example, if the barley is considered, the soil may become excessively dry about the time that the hay is maturing, which is the time the walnuts should be starting into active growth.

Unless fall irrigation is practiced the growth of summer inter-crops between the walnut trees may be conducive to winter injury of the trees. This is due to the fact that the moisture is reduced to such an extent at the end of the growing season that the trees are injured before the winter rains occur. Such a case is well shown by an orchard of three-year-old walnuts in Tustin which was interplanted to peppers. The peppers and trees were last irrigated August 28, 1918. There were no early fall frosts to complicate the case, as shown by the fact that peppers were harvested as late as November 15 in this grove. In the spring of 1919 the majority of the trees showed serious winter injury throughout the tops. Without question, the soil moisture during practically the entire dormant period of the trees was considerably below the wilting point, except in the surface foot of soil. The winter rains of 6.97 inches which fell in small intermittent amounts, penetrated the soil in nearby bean fields to the extent of only twelve to eighteen inches at the end of the rainy season.

The same results are often found where beans have been grown as an intercrop. Water is withheld from such groves during the latter part of the summer in order to ripen the beans. After the beans are harvested the soil of the grove is usually very dry. This condition may be of benefit to the walnut trees because it insures a state of maturity which will bring them through the winter in good condition. In such cases, however, winter irrigation is usually necessary and should be applied soon after the leaves fall from the walnut trees.

3. High Water-Table—A high water-table may be a contributing factor to the die-back of walnuts. When such a condition exists it is usually impossible

to bring about the early maturity of the walnut trees by withholding the late summer and fall irrigations.

In the presence of a high, more or less stationary water table, the twigs and foliage, especially on young trees, usually remain green and succulent until December, unless killed earlier by frosts.

Another condition which is equally critical and as apt to injure bearing trees, as well as young ones, is the occurrence of a fluctuating water-table. The sudden rise of a fluctuating water-table kills that portion of the root system which is located in the saturated stratum. In severe cases where the major portion of the root system is killed the twigs and young limbs of the tree later exhibit typical cases of "die-back." It might seem paradoxical that that top of the tree should dry out and die when the roots stand in an excessively wet soil, but there is nothing contradictory in the situation when it is seen that the death of the major portion of the roots makes it impossible for the top to receive the necessary moisture to sustain life.

4. Alkali Injury—Alkali injury is characteristic and may result in the death of the walnut tree. On a soil which contains alkali in harmful amounts, the edges of the leaves of walnut trees are often burned. This condition may often be seen as early as June or July and is followed by the shedding of the leaves in August and early September. The sudden and premature exposure of the twigs and limbs to the hot fall sunlight through the premature shedding of the leaves may cause severe sunburning. In such cases also the terminal portion of the twigs put forth a new crop of leaves in October which grow until killed by winter frosts. As in the typical frost injury, the twigs sunburn during the winter and much of the current year's growth dies back. In extreme cases of alkali injury, the whole tree dies after having suffered increasing injury for several years.

Summary—Winter injury or die-back of walnuts is characterized by a sudden death of the tops of the trees. Such injury is usually first noticeable during the early spring following the dormant period.

The most common causes of the winter injury or die-back are:

1. Early autumn frosts kill the immature, growing shoots. Young walnut trees are more subject to injury from this cause than older trees, because the former are usually later in maturing their new wood. Such frosts cause the foliage to drop prematurely and injure the growing tips of the twigs. The denuded twigs are subject to further injury from subsequent fall and winter sunburn. The presence or extent of this injury is usually overlooked until the following spring.

To reduce the danger from autumn frosts it is advisable to withhold the late summer irrigation in order to promote the early maturity of the trees.

2. Winter drought causes die-back in either young or bearing walnut groves. Trees suffering from this condition fail

to make new growth in the spring, except from the trunks or main limbs. The new growth on such trees has lost so much water during the winter that the buds are unable to develop in the spring. The cause of the die-back has been found to be due to an extremely low moisture content of the soil during a large part of the winter. Under such conditions the water lost from the young shoots during the winter cannot be replenished by the root system. Under such conditions the shoots die from desiccation.

Fall and winter irrigation of the walnut groves has been found to eliminate the injury from winter drought. The amount of irrigation will depend upon the type of soil, the amount of soil moisture present at the end of the harvest season, and the system of inter-cropping used.

3. A high water-table may be a contributing factor in killing walnut trees. A permanently high water-table causes the trees to prolong their growing season, with the result that they are killed by frosts. The sudden rise of a fluctuating water-table may kill a large part of the root system and produce a typical die-back in the tops, even though the wood is mature.

4. Alkali soils containing such a high salt content as to injure the root systems of walnut trees, also cause the tops of the trees to die back in response to the root injury. In the initial stages of alkali injury the leaves turn brown at the margin and fall prematurely. The denuded shoots sometimes put out a new set of leaves in the fall. The top of the trees gradually die back until the entire tree is lost.

The recovery of alkali-injured trees has never been noted by the writers. If injury is being caused by the use of irrigation water containing too much alkali evidently the use of such water should be discontinued.

The writers are pleased to acknowledge the assistance given by Mr. D. C. Wylie of the Field department of the California Walnut Growers Association and by Mr. E. E. Thomas of the Citrus Experiment Station.

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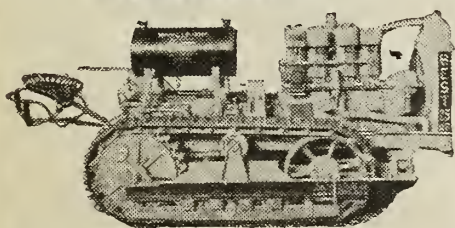
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Planting and Care Prune Orchard

Continued from page 5.

shoot out, they should all be stripped down with the exception of the three top buds. Leave these to mature; they will give you the foundation from which to start. After the close of the first year the three branches that were left to mature should be topped back to four or five inches, according to the vigor of the tree, but always leaving the bud at the end of the limb on the top and on the inner side so that when this develops into a limb the tendency will be upward and inward. In later years when the tree begins to produce heavily this will act as a brace to keep it from spreading too much. At the close of the second year prune off all except the one shoot going upward on each of the three branches left the previous year. Prune these back to six or eight inches. This may seem a waste of time and tree energy, but it must be remembered now that we are laying the foundation for a prune tree to bear heavily in after years. The third year two branches may be left at the end of each of the three previously mentioned. Prune these back to about sixteen inches. This will give you at the close of the third year a tree with six main body branches. I will say here that most generally there will be one or two of these that will not develop, so in reality we have a tree of four or five body branches. The next year two or three may be allowed, but cutting them back to twenty or twenty-four inches, according to the vigor of the tree. At the close of the fourth year the body is formed, and from that time on my object is to thin out whenever the branches seem to be too thick or crossing each other, or thinning for the size of the fruit. The fifth year the tree should begin to bear a paying crop.

Fertilization of the Young Prune Orchard—This may seem a waste of time and energy to some, but let me tell you it is one of the greatest problems facing the prune grower today. Our prune orchards, like our grain fields, will gradually produce less from year to year if they are not fertilized. It is unreasonable to think that an orchard will produce from one to two hundred boxes of fruit year after year and not impoverish the soil. The best time to begin to fertilize is when the orchard is young, before it suffers from the lack of proper nourishment. One of the best fertilizers that I know, and that one not only furnishes nitrogen but potassium and phosphorous as well, is barnyard manure. The first year put two to three tons per acre and increase this at the rate of one ton per year, and when your orchard is six or eight years old, you need not worry over its fertility. The first and second year the manure should be placed about two feet from the base of the tree. This will help to keep in the moisture. After this it should be scattered out evenly over the ground and worked in with a disc or harrow. The next best method for fertilizing the orchard is to plow down a good heavy crop of manure. For green manure sow vetch the last

of August or first of September. This will assure a good growth in the fall, and turn under not later than April 15th. I say April 15th, for if the growth is very heavy and turned under at a later date, there may be trouble in the soil drying out. If your orchard is large and you have not sufficient manure to cover the entire orchard each year, cover a section of it each year and plow down green manure on part.

Drainage for the Young Orchard—The drainage that I prefer for a prune orchard is good, deep, natural drainage. I mean by this a soil where water never stands and where the water table is from ten to twelve feet below the surface. In the valley here it is almost impossible to get a very large acreage but that some portions of it will need tile drainage. The proper time to put in drains is before the trees are set. This will allow the soil to sweeten before the trees are set, and after the trees are set they can send their roots

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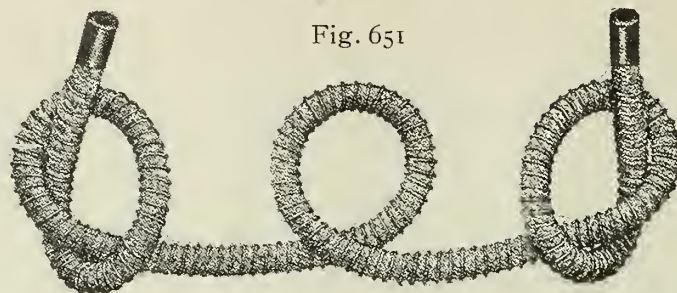


Fig. 651

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down deep where they will have greater pasturage and greater resistance. I would recommend that nothing less than four-inch tile be used and that they be put down three and a half to four feet. The idea of putting in nothing less than four-inch tile is to allow a better circulation of air through these mains.

In conclusion I will say that in taking care of a prune orchard there are problems to meet and overcome. There cannot be any set rules to follow because of the variation in the climatic conditions from year to year, the variation in the soil of different orchards, as for instance, the cultivation of an orchard where the soil was of a heavy clay mixture. By using good, sound judgment mixed with plenty of reasoning power, and then by watching someone who has made a success of growing an orchard, there is no reason why one should not succeed.

Pecan Growing Fast Developing

Hundreds of thousands of chestnut trees in the Eastern states have been killed by blight in recent years and the American production of nuts is said to be showing a tremendous reduction. In one recent year the importation of foreign nuts into the United States passed the \$20,000,000 mark and the influx is likely to continue until domestic production is heavily increased. The so-called English walnut of California and Oregon is in increasing supply, and walnut groves in those states are yielding splendid returns. However, the nut that is in highest favor just now is the thin hulled or paper shelled pecan, grown in many places in the lower south and showing its highest development in South Georgia.

The paper shell pecan is of comparatively recent importance in the market, but returns of \$400,000 for the South Georgia crop of 1919 indicate rapid increase in production although there are hundreds of acres in trees too young to bear a crop.

Government authorities underwrite the pecan as a sturdy tree, subject to few pests and diseases and bearing very heavy crops when properly cultivated. A few bearing groves in South Georgia have sold at \$1,000 the acre as against \$3,000 for walnut groves in California, but raw land suitable for pecans in South Georgia is very cheap as compared with virgin land in California.

The pecan does best on land with a good clay subsoil, a subsoil so stiff, in fact, as to require blasting the tree hole for planting out. On lighter soil the pecan makes a good growth but does not fill out the nuts so well nor bear so heavily. A careful survey of the growing trees in South Georgia indicates that the largest returns are from trees set in holes blasted in the clay subsoil.

The pecan comes into bearing about the eighth year and continues to grow indefinitely like the hickory, to which species it belongs. In South Georgia groves, field crops are grown between the trees until they get so large as to completely shade the ground.

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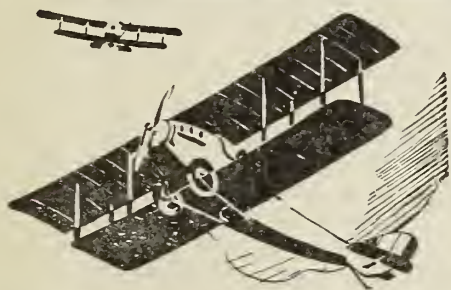
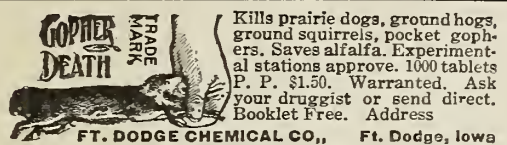
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Raspberry Culture, Etc.

Continued from page 4.

set a new plantation they wait a month after growth starts in the spring and use the suckers that come up during that month in their established plantation. If the season is favorable, this practice may prove satisfactory. If, however, a drought occurs soon after, the young plants will suffer severely. Only in sections where the climate is favorable is this practice to be recommended.

Securing and Handling Nursery Stock.

It must be remembered, however, that the root systems of nursery plants of the different varieties vary greatly, and what constitutes a good nursery plant of one variety may be a poor plant of another variety.

In case the plants are not to be set immediately, they should be heeled in; that is, a trench should be dug and the roots placed in it and covered with moist soil. In order to work the soil thoroughly about the roots of each plant it will be necessary to open the bundles and spread the plants along the trench. Sometimes it is desirable to wet the roots, or, if they are very dry, to soak them for a few hours before heeling in the plants. Just before setting it is well to dip the roots of the plants in a puddle made of clay and water or cow manure and water. The roots are thereby partially protected from the wind and sun.

Plants affected with crown-gall should not be set. This disease can be recognized by the knots and swellings which appear on the roots and about the crown. Such diseased plants are very much less productive than healthy stock.

Systems of Culture.

Three systems of culture are used in growing raspberries, the hill, the linear and the hedge system. The term "hill system" is restricted to that method of tillage in which the horse cultivator is used on all sides of each plant. When the cultivator is run in only one direction and only the plants originally set are allowed to fruit, the term "linear system" is used. If some of the suckers which come from the roots of red raspberries are left to form a solid row and the cultivator is run in one direction only the term "hedge system" is employed.

The distance between the rows in each of these systems should be determined by economy in the cost of cultivation and in the use of land. Where the area of land available for planting is not limited, usually it will be found most desirable to make the spaces between the rows wide enough to allow the use of two-horse implements in cultivation. Where the area of land is limited, the rows may be placed closer together and one-horse implements used.

Planting Distances.

Under the hill system of culture the plants usually are set about 5 feet apart each way. This, however, allows the use of one-horse cultivators only. This

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Other spray materials, for specific purposes, we recommend are:

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Orchard Brand Atomic Sulphur (patented)
Orchard Brand Bordeaux Mixture Paste
Orchard Brand Powdered Bordeaux Mixture
Orchard Brand Lime Sulphur Solution
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GHIRARDELLI'S Ground Chocolate

is used to some extent in New York and other states in raising red raspberries. It has the advantage of requiring less hand work in keeping out grass and weeds, as the cultivator can be run in both directions; and the berries can be more easily harvested from fields under this system.

If the hedge or linear system is used the horse cultivator can be run in one direction only and more hand hoeing is necessary. Under these systems the red varieties usually should be set from 2 to 3 feet apart in rows which are 6 to 8 feet distant. In the eastern United States six feet is the most common and desirable distance between the rows for the shorter caned varieties, such as the Ruby and Marlboro, and seven and eight feet for the tall-caned varieties, like the Cuthbert. To use two horses in a plantation the rows must be at least eight feet apart. In the Pacific Northwest, where the canes grow very tall, the planting distance for red raspberries is usually two and one-half by seven or eight feet. In parts of Colorado and other states where irrigation and winter protection are necessary, the plants are usually set in rows which are seven feet apart.

Black raspberries are nearly always grown under the linear system, and in the United States east of the Rocky Mountains they should be planted in rows eight feet distant and three or four feet apart in the row. In Oregon and Washington they should be planted in rows seven or eight feet distant and from three to six feet apart in the row, depending upon the vigor of the growth in the particular locality.

The purple varieties also are grown under the linear system and should be planted four or five feet apart in rows which are seven or eight feet distant. The Columbian and other purple varieties of equal vigor should be at least five feet apart in the row, but the Royal may be set four feet apart.

If the plants are checked in both directions when set in accordance with either the hedge or linear system and are three or four feet apart in the row, it is possible to run a one-horse cultivator both ways for the first year. This will save much work and reduce the first year's expense.

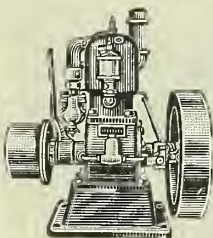
In some sections, two plants of red raspberries are set together. This insures the grower against misses, and a larger crop is secured when the plantation is one year old. It will cost much more per acre to buy and set the extra plants, but in some sections the additional yield will make it profitable. However, if care is taken in setting, one plant in each place is usually sufficient.

Setting the Plants.

Before planting, the tops of the plants of all types should be cut back to six inches or less in height. To make it easy to handle the plants and to indicate the rows after setting, four to six inches of the cane should be left. If a garden patch is being planted, it is better to cut the canes back to within a few inches of the leader buds. The plants should be set slightly deeper than they

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formerly grew. Sometimes it is well to set red raspberries as much as three inches deeper than they grew, in order to protect them from drought. Black and purple raspberry plants should be set not more than an inch or two deeper than they formerly stood, as there is danger of smothering the tips.

An inexpensive method of setting the plants is to have the rows marked out previously and have the plants dropped every three feet along the row. The spade is thrust into the ground, the handle pushed forward, and the root placed in the space thus opened. The spade is next withdrawn and the earth firmed about the roots. Plants should not be dropped much ahead of those who are setting them, however, as exposure to the sun and wind weakens the roots.

Moisture Supply in the Soil.

From the time raspberry plants are set, they need an ample supply of moisture, and they are affected more quickly and seriously when it is deficient than most other fruit plants. In the sections where the highest average yields of red raspberries are obtained, often 6,000 quarts of fruit per acre are secured. The average for the whole country, however, is not more than 1,500 quarts and this difference is due almost wholly to a difference in the moisture supply. In the sections referred to as giving the highest yields, a deep soil furnishes a uniform and ample supply of moisture at all times. To secure the best results, therefore, the grower should, by tillage and by supplying humus, maintain a uniform and ample moisture content in his soil, not only during the growing and ripening of the fruit but also while the canes are developing. Some growers make it a regular practice each year to mulch their fields to a depth of several inches with straw, leaves, or green hay. When this practice is followed, the cost is great but the moisture supply is retained well.

In semi-arid and arid regions where irrigation is practiced, the fruiting season is longer than in most humid or non-

irrigated sections. The use of irrigation in the eastern states of late has extended the picking season and made the plants thrifter. Larger yields of fruit of the Ranere raspberry in the summer and fall have followed the irrigation of that variety and made it profitable in some sections of the East.

In the semi-arid and arid regions of the Pacific Coast, irrigation should begin almost as soon after the rainy season as is necessary for garden crops and should be continued at least until after the picking season is over. The frequency of irrigation will depend upon the local climate, the soil type, and the management of the soil. In Southern California, the plantations should be irrigated as often as every week during the fruiting season, and about once in two or three weeks during the rest of the dry season. A cultivator should be run between the rows after each application of water. When this is done the irrigation need not be so frequent, and the soil will be kept in better condition than without such tillage. Under such treatment the Surprise red raspberry will produce not only a good second crop of fruit during the late summer or early fall in some parts of California, but also some fruit almost continuously from the first picking in the spring until late autumn. In arid and semi-arid sections other than California such frequent irrigation is not often used; its frequency is determined by local conditions.

In the humid sections of the eastern states, irrigation should be used chiefly or entirely during the growth and ripening of the fruit and will pay only when an ample moisture supply can not be maintained by tillage. As the raspberry ripens its crop during the sum-

mer when droughts are likely to occur, growers have found irrigation profitable.

Intercropping.

In order to reduce the cost of intensive cultivation of a raspberry plantation during the first year after setting, other crops that need cultivation during the spring and early summer months may be grown between the rows. Among the crops best suited to this use are the tomato, cabbage, cauli-

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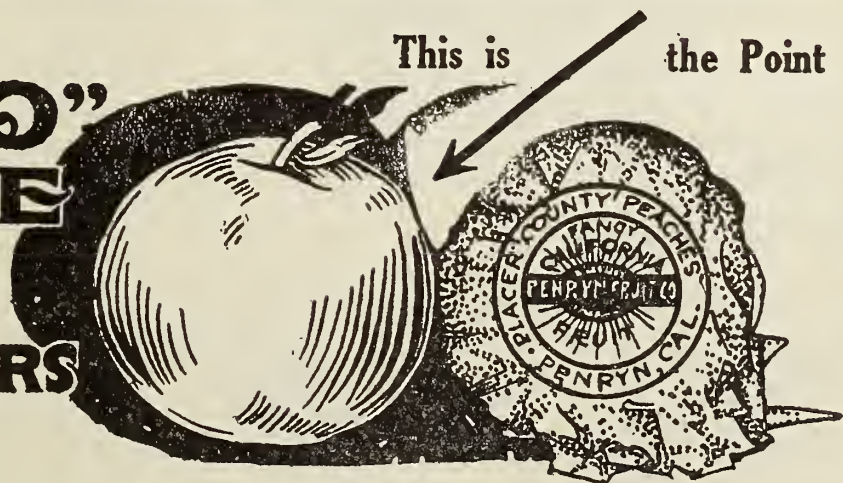
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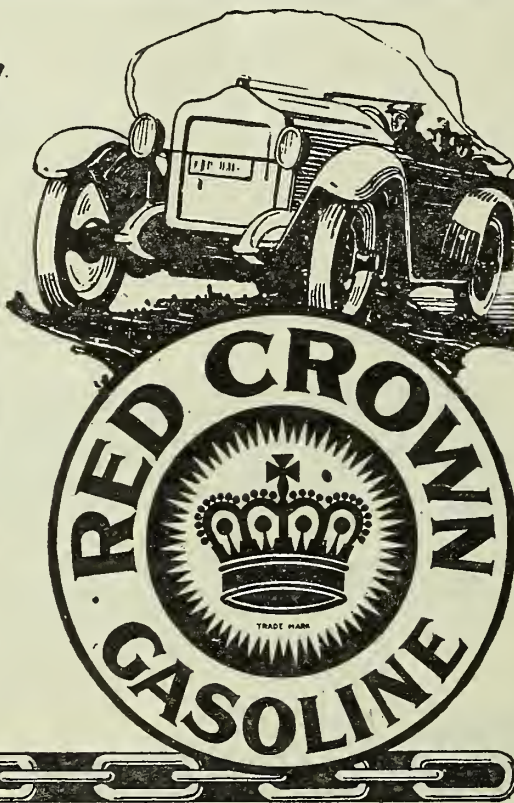
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flower, bean, pea, summer squash, and potato. Grain crops should not be used, as they are not cultivated and will take moisture and plant food needed by the raspberry plants. The second season no other crop should be grown, as the raspberry roots should occupy all the ground.

Tillage.

Tillage in raspberry fields must be thorough and more regular than for most other crops. If grass and weeds get a start, it is very difficult to clean the rows. Not only will it prove costly to clean them, but grass and weeds take the needed moisture and interfere with the development of new canes. If grass is allowed to make a sod in a field trained to the wide hedge system, it is usually cheaper to set out a new field than to clean out the sod.

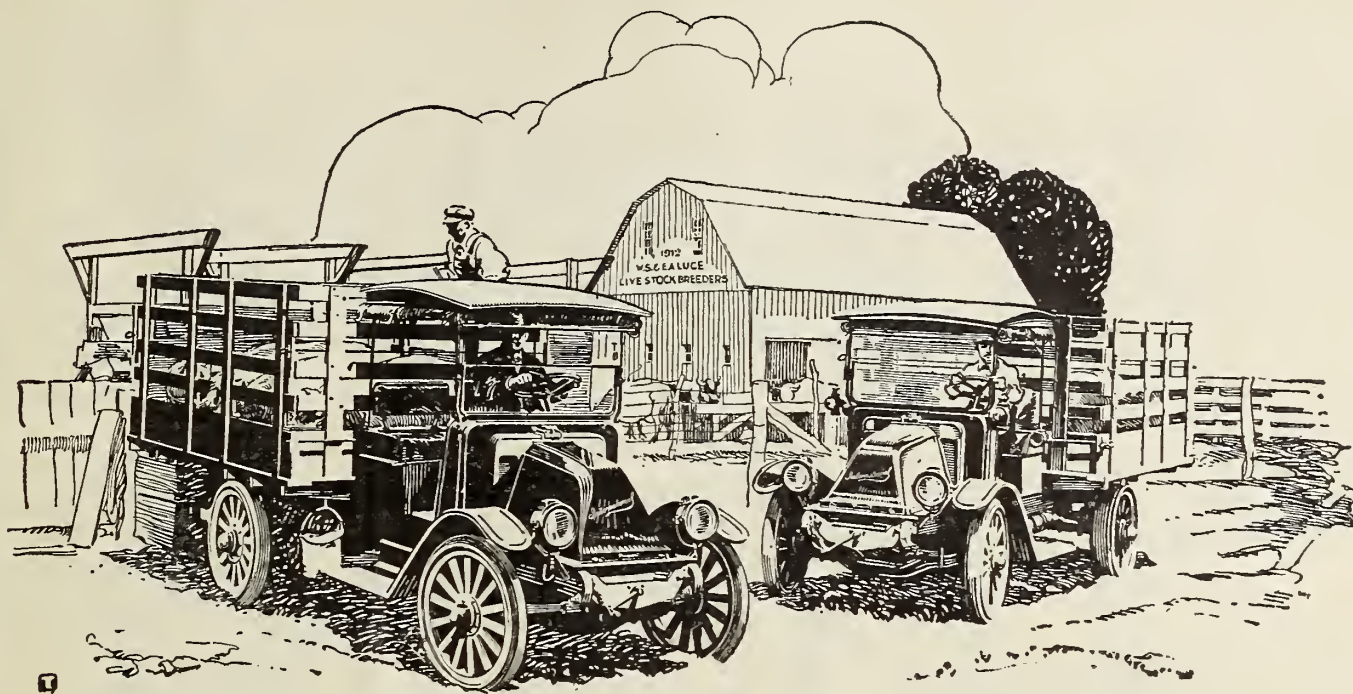
Tillage should be thorough and regular in order to conserve moisture. Except in rainy weather, a cultivator or harrow should be used at least once each week up to picking time. Some growers consider it profitable to use it as often as twice each week, and this is sometimes necessary during periods of extended drought. The cultivation should stir the soil to a depth of two to three inches only, as part of the raspberry roots are shallow. Many growers shorten the cultivator or harrow teeth which run next to the plants, so as to disturb the young feeding roots near the surface as little as possible.

During the harvesting season the berries need an additional supply of moisture, and ordinarily the cultivation should be continued. Many growers cultivate after each picking, loosening the soil packed down by the pickers. If too much dust is carried to the fruit it may be necessary to cultivate only occasionally during the picking season. Also if no trellis or stakes are used and if the canes bend over under a crop of fruit it will be impossible to use a cultivator without knocking off too much fruit.

Later tillage is for the purpose of keeping down weeds and grasses. The fields should be free of weeds during the winter season, as many kinds start quickly in the spring and are difficult to destroy after the soil is in condition to work. Autumn tillage, however, tends to develop new growth, which is tender and somewhat more subject to winter injury than the older growth. Autumn tillage, therefore, should be avoided as much as possible where there is danger from severe winters.

The use of fertilizers in raspberry plantations is governed by the same principles that apply to their use with other fruits. As soils vary in the quantity and availability of the plant food they contain, the fertilizer problem is a local one which each grower must solve for himself. By using varying amounts of the different elements of plant food on different plats and keeping a record of the yields, each grower can determine readily what kinds and quantities of fertilizer to apply.

Good management, however, will insure a large amount of humus in the soil at all times.



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